THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXVIII. No. 1732.] LONDON, JULY 21, 1896. [48TH YEAR. PRICE 6d.

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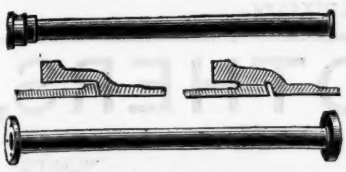

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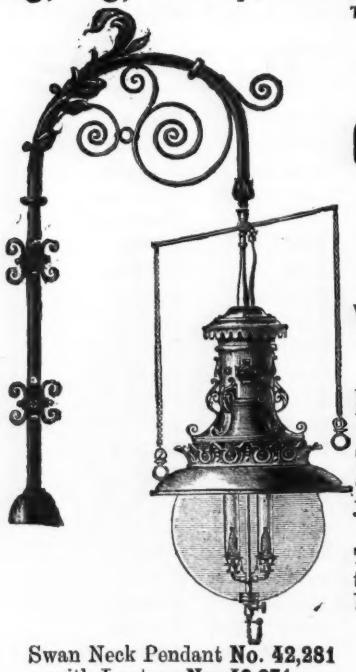

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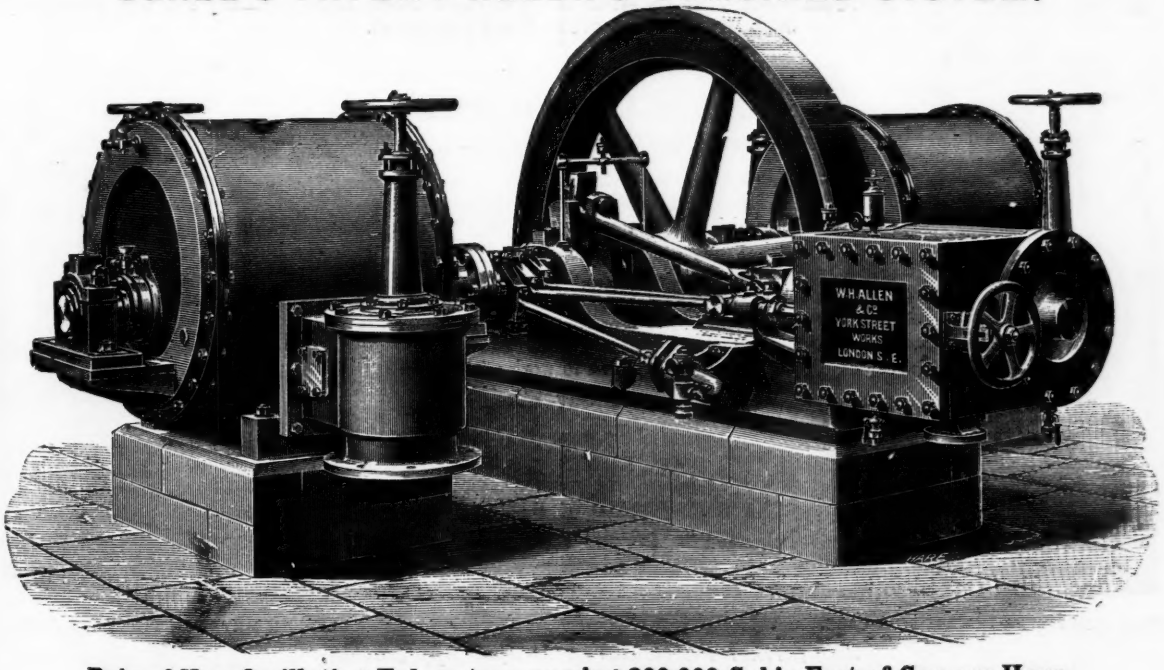

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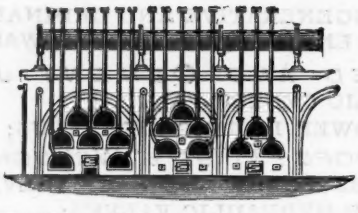
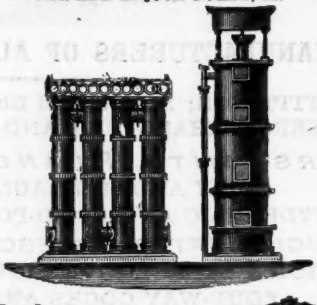

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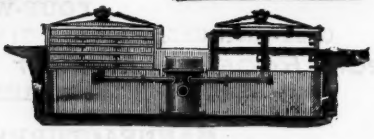

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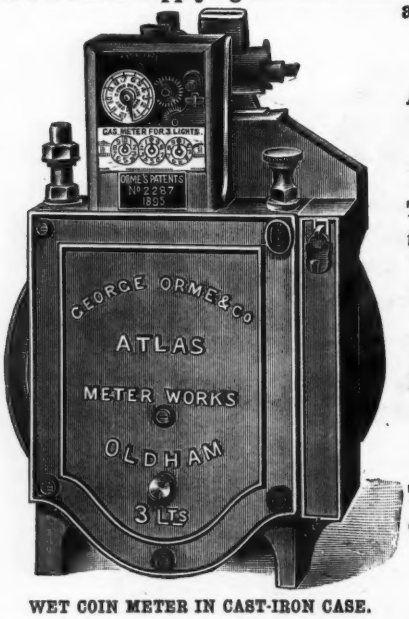

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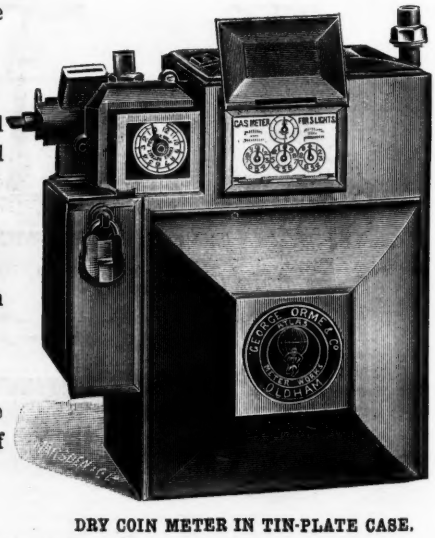

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1894	Sligo Gas Company	3	All	50	54
1891	Cie L'Union des Gaz Milan	2	All	116	46
1892	Bathurst (N.S.W.)	2	All	82	36
1895	Athens (Greece)	2	All	64½	42
1890	Tyne Dock Gas-Wks., N.E.Ry.	2	All	71	42
1890	Newburn-on-Tyne	2 & Tank	All	47½	52½
1894	St. Austell Gas Company	2	All	34	34
1894	Birkenhead Corpn.	4	2 Top	160	120
1894	Cape Town (S. Africa)	3	Do.	50	48
1892	Nottingham Corpn.	4	1 Top	100	100
1892	Nottingham Corpn.	4	1 Top	90½	100
1893	Do.	4	Do.	90½	100
1893	Do.	4	Do.	90½	100
1890	Manchester Cor. (Gaythorn Wks.)	3	Do.	130	90
1890	Do. Do.	3	Do.	100	75
1890	Do. Do.	3	Do.	100	75
1889	Do. (Rochdale Road)	3	Do.	100	75
1891	Darlington Corpn.	3	Do.	100	73½
1895	Barrow-in-Furness	2	Do.	100	41
1889	Haslingden Union Gas Company	2	Do.	80	44
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Derby Gaslight Co.	4	Top	125	102
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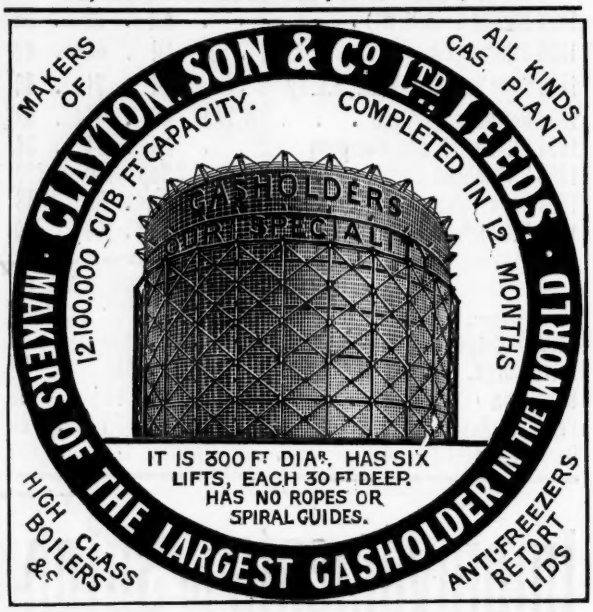
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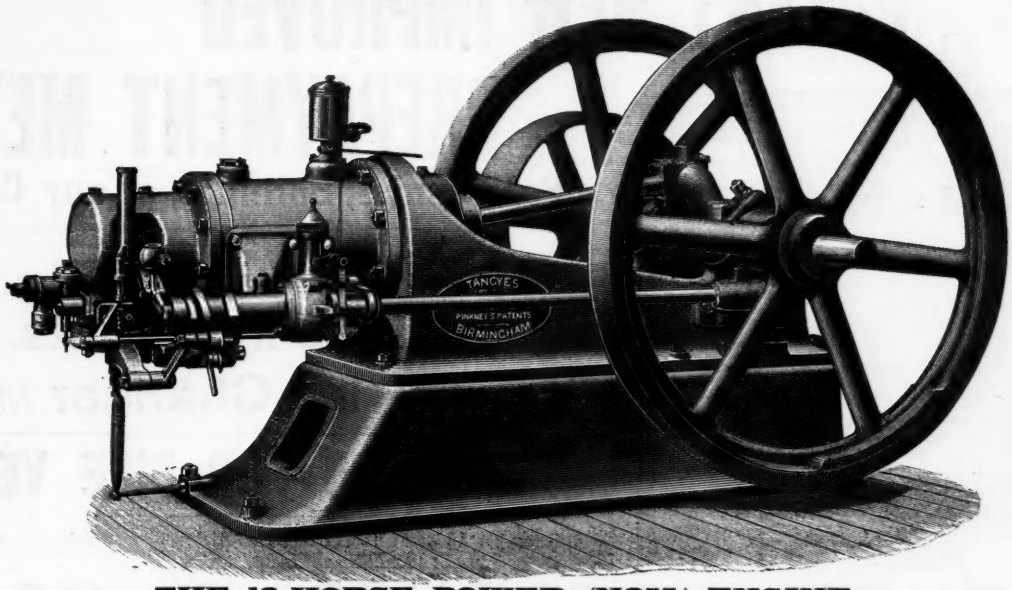

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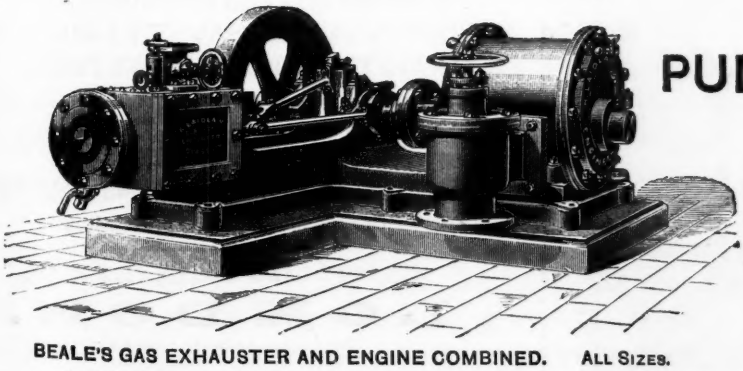

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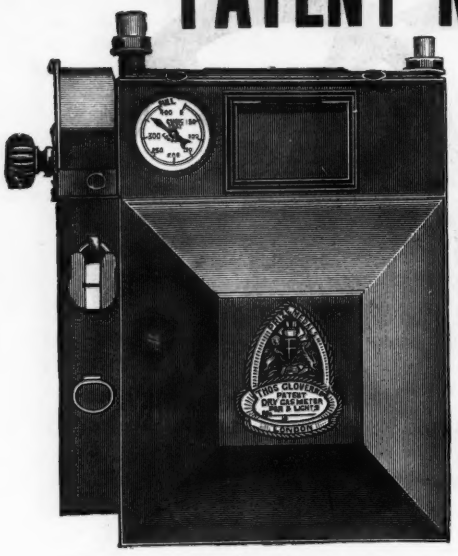

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EDITORIAL NOTES.

The Federated Coalowners' Case.

A LONG statement of the Federated Coalowners' position has been made public by Mr. Thos. Ratcliffe Ellis which calls for notice after our last week's remarks on coal prices and miners' wages. It should be read in connection with the claim stated to have been advanced since the last meeting of the Conciliation Board by Mr. Pickard, M.P., that miners' wages ought to be at least 15s. 6d. per day. It is meanwhile reported from Derbyshire that, as a matter of fact, pitmen can and do earn at present rates as much as 10s. 6d. per day; but in many places they can only find work for two days a week. Hereupon, as Mr. Ellis states, it is evident that the amount of the collier's earnings depends upon the weight of coal he is able to get at the current rate, and not merely upon the daily rate itself. Yet this is a consideration that has never been common ground as between masters and men. The Colliers' Unions have concerned themselves wholly with the raising of the rate of wages, and, when raised, preventing them from being lowered by referring to the socialistic principle of the "living wage," and by other devices put forward to show the advantages of organization. The employers' case is that the figure to which the rate of the collier's daily wage may be forced has no connection with the amount of his weekly earnings. It may be asked, in passing, why there should be any question of daily wages at all, if coal getting is paid for as piecework. Supposing, however, that in this connection daily wages and piecework prices are naturally convertible, it is, or should be, obvious to the capacity of the dullest collier that he may be paid a high rate of wages, and yet have little money to take home at the week-end if there is little work for him to do.

As Mr. Ellis appears to argue, it is to the common interest of the coalowner and collier that as much coal as possible should be got and sold. Yet, in order to sell the product, it is necessary for the coalowner to take whatever price he can get for it; and this means that the more favourably situated collieries can do business upon terms that are ruinous to others which have nevertheless to pay as much *pro ratâ* for getting the coal. So prices fall; and as long as the most favourably situated colliery—not in one field only, but in all fields serving the same market—can make up for low prices by selling an increased quantity, there is nothing to stop the depressing process. The experiment entered upon in 1894, of keeping wages fixed for two years for the whole of the Federation districts, was adopted, says Mr. Ellis, in the hope that it would prove mutually advantageous. Unhappily, it has turned out disastrously to both parties. The collieries affected by it have in many instances lost their custom through not being able to supply at prices willingly accepted by others. "Many mines, being unable to stand the cost "of working, have been stopped, and the workpeople "formerly engaged in them have been disbanded; while "in those mines which have been continued at work the "time made by the colliers has been only a few days per "week, and the quantity of coal which they have been able "to get has been correspondingly diminished. The effect "of this state of things has been, and is, that, although "the men have had a high rate of wage maintained "for them, they have been receiving less money per week "than they earned when the rate was less." It is asserted that nearly 5000 men have thrown up coal mining during the past year for this same reason; so that on this point the hard logic of economical facts has already brought many masters and men into practical accord that coal mining under the fixed wages agreement does not pay.

Mr. Ellis's case is summed up in the observation that the course of the coal mining industry within and without the federated area as officially registered for 1892 and 1895 shows that there was less coal produced in this area last year by upwards of a million tons; while outside there was an increase of more than nine million tons. It is useless to talk about maintaining the so-called "living "wage"—meaning an artificially high rate of daily pay—when the output of coal is diminishing, notwithstanding the fall in prices. Mr. Ellis roundly states that the coalowners in the federated area must have a reduction of wages if they are to recover their lost trade and maintain themselves for the future. They would

prefer the continuation of the Conciliation Board, with an outside Chairman, as a means of obtaining the adjustment of wages to market conditions from time to time. But if the men, acting under the guidance of their leaders, will not have this way of settling the wages question, Mr. Ellis allows it to be understood that the masters will go about the business in their own way. This means a strike and a lock-out during the autumn, if both parties are sincere and determined—a large presumption. It is perhaps unavoidable that differences between parties inspired by such irreconcileable differences of principle as characterize the commercial coalowners and the socialistic labour leaders should be settled by fighting; but, all the same, it would have been fairer if the Chairman of the Conciliation Board had had a chance of pronouncing upon the question of the necessity for a reduction of wages before the men were balloted upon it. Naturally enough, the men would say they would strike rather than accept the smallest reduction of wages. But, if the employers have economic truth upon their side, they are certain to win in the end; and it would be satisfactory to have the independent Chairman's views on this point before fighting begins.

Mechanical Power on Roads and Tramways.

When our contemporary the "Engineer" announced its munificent prize offer of a thousand guineas to encourage mechanical enterprise in the direction of the development of horseless road carriages, we noticed the fact in these columns, and duly applauded the public spirit that prompted the offer. We discussed the prospects of the new departure; but we could not honestly get up much enthusiasm over it, since it appeared to our disinterested judgment that the application of mechanical power even to the working of light railways and tramways had not attained success of a kind to encourage the hope of superseding animal by mechanical power on common roads. Hence we were not at all surprised a month ago to learn that the "Engineer," upon further consideration of the matter, had decided to postpone its prize competition from the coming autumn until some time next year. The reasons for this postponement have been very fully and fairly given by our contemporary; and the action itself has received the unanimous approval of engineers and others who have particularly interested themselves in the subject. These reasons need not be recapitulated here, especially as they are very much on the lines of the historic excuses of a local authority for neglecting to ring the town bells in honour of a visiting monarch. As a matter of fact, a satisfactory mechanical road carriage has not yet been produced; and there is very little encouragement for the hope that anything of the kind will be forthcoming either this year or next.

There are, of course, petroleum road cars and benzoline bicycles, of sorts; but nothing of the kind *in esse* or *in posse* is more likely to supersede the common omnibus, to say nothing of the victoria or the hansom cab, than is Maxim's flying-machine. The condition of the case of mechanical traction as applied to tramway working, is quite sufficient warranty for this conclusion. There is no reason whatever why an engine that is competent to drive a road carriage should not in the first place serve a period of probation on the rails; and where is anything of the kind to be seen besides the lumbering steam tramcar, and, very recently, the gas-power car? The Glasgow Corporation have actually pending the consideration of a report by a Sub-Committee, declaring that the most successful system of mechanical traction for tramway working is—the "trolley "wire" electrical system! We ventured last week to protest against this conclusion; and we repeat the protest, without special reference to the capabilities of the gas-power tramcar. We venture to think that if the slow, painful labour of the tram horse is only to be dispensed with at the cost of adopting in his place something which is a confessed nuisance, the wretched animal in question is likely to remain with us for an indefinite period. When it comes to the point, the tramcar itself is a good deal of a nuisance from the point of view of all users of the thoroughfare in other ways. The result of a really great success in the application of mechanical power to tramway working would be to render tramways unnecessary except for certain situations, where they are practically light passenger railways. The gas-power tram car is not a success of this magnitude; but neither is anything else of the kind. For the time being, however, the gas tramcar is the only possible mechanical alternative to the trolley wire abomination.

All this is far enough from offering even the germ of a satisfactory mechanical road carriage, such as, to use the "Engineer's" sensible test, a busy doctor would like to buy for doing his daily round. It is only when one takes such an example as this, of what is needed in a successful vehicle of the kind, that it is possible to realize how great is the distance that improvement has yet to cover before making such an approach to finality as that attained in the modern bicycle.

The Coin-Freed Meters of The Gaslight and Coke Company.

In the House of Commons last Thursday, Mr. J. Stuart, one of the parliamentary spokesmen for the London County Council, addressed a question to the President of the Board of Trade as to the reported discontinuance of the issue of automatic prepayment meters by The Gaslight and Coke Company. The question also conveyed the intimation that matters in this regard were differently ordered by the South Metropolitan Company, and terminated with an inquiry as to whether steps could be taken "to secure that equal facilities should continue to be "given by The Gaslight and Coke Company." In reply, Mr. Ritchie stated that he had been informed by the Directors of The Gaslight and Coke Company that "they have been, and are, supplying automatic prepay-"ment meters, together with stoves and gas-fittings, at "the rate of about 500 a week; that since July 1 last year "the Company have supplied 31,462 customers; and that "they have on hand orders which are being executed as "quickly as the meter makers can deliver the necessary "apparatus." It was further stated that "some months "ago, owing to the inability of the meter makers to furnish "the Company with the meters as fast as applicants were "sending in their requests for supplies, the Directors, to pre-"vent disappointment, found it necessary to suspend accept-"ing any further orders until they should be in a position, "with the aid of the meter makers, promptly to execute "every order as and when received." This admission justified Mr. Stuart's inquiry; and the resumption of the issue shows that The Gaslight and Coke Directors have had the wisdom to accept the inevitable consequence of their own deliberate action. The vouchsafed explanation of the suspension, which was notified in these columns at Easter, does not, of course, account for the fact that the meter and fittings makers received notice that no more goods of the kind would be required after the fulfilment of running orders and contracts, which was a peculiar way of inciting them to diligence and enterprise in coping with the popular demand. The great fact to be observed, however, is that the movement for the popularization of gas in London is not to be checked, as was feared, by the permanent reversal of The Gaslight and Coke Company's new and enlightened policy in this regard.

The Examinations in "Gas Manufacture."

The names of the prize winners in this year's Technological Examinations in "Gas Manufacture" are published in another column; thus completing the results of the year's work in this branch of technical study. We gave the question papers set by the Examiner (Mr. Alfred Colson, of Leicester), on May 12, and the pass list on the 7th inst. It must be confessed that the meagreness of the list of prize winners this year is a source of disappointment. Only three candidates take prizes, all in the Ordinary, not one in the Honours grades. A single name —that of Mr. L. Hislop—appears in the first class of the Honours Grade, as against three last year; and there are fourteen pass-men in the second class of this grade, as against nineteen last year. As a set-off to this, twenty-five candidates satisfied the Examiner in the Ordinary Grade, First Class, as against twelve last year; and twenty-four names appear in the second class of this grade, as compared with twenty-six last year. The number of students appears therefore to have been fairly kept up, although the quality in the upper rank was not an improvement on the previous record. The questions set were consistent with precedent, and with one another. The Ordinary Grade paper was well adapted to sound the intelligence of the students; and the circumstance of so many having passed is the most satisfactory thing in the whole business. The Honours Grade paper is always very difficult to set; and if anybody were to characterize that for the present

year as a "stiffish" one, we should not disagree with him. Here again, however, the Examiner has been consistent, asking nothing more than a fairly advanced pupil of any good gas manager and engineer ought to have made himself acquainted with. If anything, last year's paper only too plainly pointed the way for its successor; but this does not seem to have made matters easier for the candidates. Indeed, a slight, but judicious alteration of the adjustment of a question that appears to be directed generally to the same subject as one that went before it, may be particularly helpful in discovering whether the candidate is well grounded in the matter, or has merely got it up by the objectionable method of "cram." We must do Mr. Colson the credit of commending his papers as not easy to negotiate by the latter process, and of keeping clear of matters of mere opinion. It is eminently safe to ask a candidate in the upper grade what description of apparatus he would employ to obtain a stated result; as in properly answering such a question the examinee must disclose in about equal proportions whatever experience and judgment he may possess. These are the highest qualifications a question paper can elicit.

The Gains of Financing.

It is not often that the official speeches of Chairmen of financial companies afford interesting reading to others than the proprietors; but the observations of Mr. John Green, presiding at the recent ordinary general meeting of the Union Discount Company of London, Limited, proved a welcome exception to the rule. Everybody, it may be truly said, is affected either directly or indirectly by the condition of what is vaguely termed the Money Market, though what is meant by the term is understood only by the comparative few who have dealings in Lombard Street. It is the deepest of mysteries to outsiders why "money" should be said to be "cheap" or "dear," mainly because they do not understand the technical sense in which the word "money" is used in this connection. The Money Market stands for many things; and among others, as Mr. Green said on the occasion in question, it is closely identified with "the stability of things in general." Mr. Green also stated that trade in all departments has been growing in volume during the past year, while the prices of commodities have also increased rather than otherwise. Yet statistics of this order do not afford any explanation of the prolonged depression in the value of money. "From one cause or another, the English people "had resolved to invest in home securities and industries; "and to this circumstance was principally owing, he "thought, the phenomenal accumulation of money and the "prolonged low rates. This had most largely contributed "to the great rise in gilt-edged securities. When the "various countries of the world regained the confidence "of British investors, and when the investing public "got tired of 2 per cent. from home investments, the "period of excessive cheapness would give place to more "normal rates for money." Mr. Green went on to point out that, so far as this particular Company was concerned, they now had to do about double the business which they formerly did in order to make the same profit and earn the same dividend; and he feared that this was the tendency of the times. There can be no question as to the correctness of the last observation. Increased efficiency is the only means of meeting the pressure of financial and industrial competition. There can be no "Union stroke" for those who are embarked upon the race for commercial existence, to say nothing of supremacy. It would be very interesting if Mr. Green would publish some views, from his standpoint of financier, upon current Socialist ideas.

The British Gas Traction Company, Limited.—Under this title, a Company has been formed with a capital of £250,000, in 50,000 shares of £5 each, to acquire the British patent rights for the system of working tramways, light railways, &c., by means of motor cars actuated by gas-engines, invented by the late Carl Lührig, of Dresden, and Mr. H. P. Holt, of Messrs. Crossley Bros. Among the principal objects of the Company are to build and sell gas motor cars in Great Britain, and to equip and work tramway lines by contract. The advantage claimed for the system (apart from the diminution in cost) is that each car carries its own power, and is thus independent of a central station. The whole of the fixed plant can, it is stated, be obtained for £300 or £400; and no special form of line is required. The purchase price has been fixed by the vendor Company at £105,000, payable as to £55,000 in cash and £50,000 in fully-paid shares.

WATER AND SANITARY AFFAIRS.

The withdrawal of the Metropolitan Counties Water Board Bill is the occasion of much unwarranted jubilation on the part of those who act as the assailants of the Water Companies. The Bill has not been rejected, nor summarily overthrown, like the Transfer Bills of the County Council. It simply got belated, so that any attempt to carry it through Parliament in the present session was rendered impracticable by the efflux of time. It is true that it was opposed; and hence there was no chance of getting it through the Commons in the brief period that remained. But opposition awaits any measure dealing with the London Water Question, especially such a scheme as the County Council brought forward for the purpose of seizing on the property of the London Water Companies. Nevertheless the idea is cherished among gentlemen of the Progressive persuasion, that, the Water Board Bill having been withdrawn, the way is left open for the County Council to renew their former tactics. This notion will doubtless find strong expression when the adjourned report of the Water Committee, bearing the date of June 5, comes up for consideration at the meeting of the Council to be held to-day. Yet the door is not so wide open as some affect to believe. Mr. Chaplin, when announcing in the House of Commons last week that he did not propose to carry the Water Board Bill to a second reading, stated that the Government were fully alive to the importance of this question, and hoped "to take an "early opportunity of dealing with it next session." Mr. Stuart, speaking in the County Council, recognized this, and has used it as an argument why the Council should immediately resolve "to proceed with the question "in the next session of Parliament." We may therefore expect to see the Council preparing to go before Parliament next year with a scheme for bringing a supply of water to London from the watersheds of the Usk and Llangorse, and also with "a Bill or Bills" for purchasing the undertakings of the eight Metropolitan Water Companies. What shape the scheme of purchase is to take, it is difficult to apprehend. The errors of the present year cannot possibly be repeated, except with the certainty of discomfiture. Yet the cry is raised: "Now that the "Government Water Bill is dead, all parties should be "united in reviving the Purchase Bills." The Government Bill is not dead; but the Purchase Bills are defunct.

It is said that "the London Water Companies will be "disappointed with the report which the Select Committee "of the House of Commons on their Bills have presented to "Parliament." If so, we apprehend that the County Council will be equally disappointed. The report is not hostile to the Companies. For our part, we may say concerning it, as we said with respect to the Water Board Bill, we are not enamoured of it, but it has something to recommend it. Certainly, the report of the Select Committee puts the Welsh project a long way off. It shows that no such scheme can be brought into operation for "at least thirteen "to fourteen years from the present time," and that "London must be supplied under any circumstances for "several years to come, and probably always to a great "extent, from the present sources of supply." We find it argued that the report points to "purchase," in order to free "both the Water Companies and the inhabitants of "London" from an anomalous position. But the report also points to regulation, because it is said that, under any circumstances," the present sources must be relied upon for many years to come, and probably always to a great extent. If there is to be a speedy transfer of the undertakings to the County Council, or even to the Water Board, why are the Committee so emphatic in requiring certain of the recommendations of the Royal Commissioners to be carried out with regard to filtration and pumping, and the functions of the Water Examiner?

This last point has distinct reference to the Water Companies, who are to be placed under law in respect to the Examiner in matters where now he simply depends on their courtesy, which it is acknowledged never fails. So far as filtration and pumping are concerned, the recommendations of the Royal Commissioners seem to involve a very injudicious interference with functions best left where experience serves as a guide. Had the law regulated filtration in years gone by, the process would never have been so perfect as it is now. The "Daily News" some little time ago made a striking allusion to the fact that "the

"opposition of the East London Water-Works' Engineer "to official requirements" in respect to the filter-beds, was subsequently proved to be in strict accordance with principles evolved in the scientific researches of Dr. Frankland and Dr. Koch. In urging the adoption of certain regulations by which the Companies are to be controlled, the Committee seem to be a little at variance with their final request for something to be "speedily" done which shall change the entire situation. But the report is reasonable in its general tone, and gives a really interesting view of what may be called the present crisis in the history of the London Water Supply. It is also itself, in some measure, a sign of the times.

The Bill of the New River Company and the Staines Reservoirs Bill have been referred to a Select Committee over which the Duke of Westminster will preside. By an unfortunate and rather singular arrangement, these Bills, so urgent in their character, have been placed last on a miscellaneous list of eight. "The Times" remarks that "this in all likelihood will bring the period at which "they can be discussed dangerously near to the close of "the session."

PERSONAL.

Sir Owen T. Burne, K.C.S.I., has been elected Chairman of the Council of the Society of Arts for the ensuing session.

Mr. Henry Simon, of Manchester, has presented to Owens College the sum of £5000 for the endowment of a Chair of German Language and Literature.

Mr. T. R. Collins, formerly Manager of the Bloxham Gas Company, has obtained a similar appointment with the Stony Stratford Gas Company; and Mr. C. Betteridge, of Chipping Norton, succeeds Mr. Collins at Bloxham.

Owing to the death of Mrs. Thomas Glover, and to facilitate family arrangements, the business of Messrs. Thomas Glover and Co. has been converted into a private Limited Company. For many years past, the business has been controlled by Mr. Richard Thomas Glover and Mr. John George Glover (sons of the late Mr. Thomas Glover), who have been connected with the firm since 1868, and will become Managing Directors.

The sole proprietorship in the firm of Messrs. Alexander Wright and Co., of Westminster, has been purchased from Mr. Frank Wright by Mr. J. F. Simmance and Mr. Jacques Abady (late Manager to the firm); and the photometrical, experimental, lighting, and ventilating business will be carried on by them under the old style. It will be understood that this transfer entirely severs the connection between Alexander Wright and Co. and Frank Wright's Prepayment Meter Corporation, Limited.

OBITUARY.

Mr. J. Bartholomew, one of the founders of the Chertsey Gas Company, and for many years Chairman, died last Tuesday.

Mr. Courtney John Page, who was for upwards of forty years Accountant to the New River Company, died recently, at his residence in Hornsey, at the age of 64.

Mr. T. Wilton, who about a year ago resigned the managership of the Tonbridge Gas Company, died on the 12th inst., at his residence at Ramsgate, after a brief illness.

Mr. T. H. Keble, who, in association with other gentlemen, promoted the Margate Water Company, died last Friday at the advanced age of 82. Deceased was a Justice of the Peace.

Mr. W. T. M'Gowen, the Town Clerk of Bradford, died somewhat suddenly last Saturday, in his 82nd year. He was at the meeting of the Town Council on the previous Tuesday, and attended at the Town Hall on the following day; but he contracted a cold which led to pulmonary congestion, to which he succumbed. Mr. M'Gowen was educated for the legal profession; but in 1853 he accepted the appointment of Deputy Town Clerk of Liverpool. In July, 1861, the then Town Clerk of Bradford (Mr. W. H. Hudson) died, and Mr. M'Gowen applied for the position. It was, however, given to Mr. Rayner, a solicitor of Brighouse. Five years later, Mr. Rayner succeeded Mr. Shuttleworth as Town Clerk of Liverpool; and Mr. M'Gowen was induced to apply for the vacant post at Bradford. His application was successful. The affairs of the Bradford Corporation needed at that time the supervision of an adviser possessing energy and legal acumen; and Mr. M'Gowen brought both of these qualifications to bear in the discharge of his duties. His worth was recognized by an advance in his salary within twelve months of his appointment, and again subsequently. When he took office, the town already had possession of the water-works; but under his supervision the transfer of the gas undertaking was carried through. Mr. M'Gowen was a widower; and he leaves a family of four sons and two daughters. The funeral will take place to-morrow morning in Scholemoor Cemetery.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 131.)

Signs are beginning to manifest themselves in Capel Court that we are getting through the month of July, and approaching the holiday season; for the attendance in the Stock Exchange last week began to fall off, and business was decidedly quiet. The general tendency too was flat and depressed. This was consequent upon the perturbed condition of the American market, arising from the deplorable state of political affairs over there. Owing to this influence, prices in nearly all departments suffered. Almost the only exception to the rule was in Home Rails, where the rates of dividend have come out satisfactorily pretty well all round. The settlement did not provide any remarkable incident. The Money Market remains in its old condition of extreme ease. In the Gas Market, as in all the rest, there was a falling off in the extent of business—one day being just as quiet as another. There was an absence of every distinguishing feature beyond the steady and continuous maintenance of great firmness in values. Changes in quotations are extremely few; but, of course, they are all in the upward direction. The only thing remarkable about them is that they are nearly all in the debenture stock issues; illustrating the persistent demand for high-class investment securities. In Gaslights, the "A" opened strong at an immediate advance, which it held to the close; the last mark on Saturday being 318½—the best of the week. This was after the announcement that the 12¾ per cent. dividend will be maintained; recourse being had to the extent of £55,000 out of the balance brought forward. Not so bad, when the state of the markets for residuals is considered! South Metropolitans were quiet, but very strong. The "B" commanded a 322 price. A few dealings were marked in Commercials at good figures; and the debenture rose. The Suburban and Provincial group were an absolute blank, without a single transaction, or any change in price. The Continental Companies were quiet and steady, without variation. Among the rest, a few changed hands at good firm figures; but quotations were unaltered. The Water Companies were much more active than in the preceding week; but again they moved irregularly. Kent, Lambeth, and West Middlesex were the gainers; but East London and Southwark lost position.

The daily operations were: Business in the Gas Market opened very quietly, and remained slack all day. Prices, however, were good generally; and Gaslight "A" rose 1. In Water, Lambeth gained 2. Transactions on Tuesday were still very limited; and prices in Gas were unchanged. In Water, Kent new and West Middlesex debenture advanced 2 each. Wednesday was rather more active, with good prices all round. Commercial debenture and Gaslight 6 per cent. ditto rose 2 each. East London Water receded 2. Thursday fell quiet again; and the only change was a loss of 2 in Southwark Water. Gas remained without variation on Friday; but in Water, Kent new was 2 higher. Saturday was quiet, but very firm; and quotations were unchanged.

ELECTRIC LIGHTING MEMORANDA.

Petition for Prolongation of the Hopkinson Three-Wire Patent—The Bower-Barff Precedent—Patentees and Assignees.

The Judicial Committee of the Privy Council disposed last Wednesday of an important petition presented by Dr. John Hopkinson, F.R.S., and the Westinghouse Electric Company, for the prolongation for a term of 14 years of Dr. Hopkinson's "three-wire system" patent, granted in 1882. There was a swarm of objectors to the petition, including many local authorities; but before the merits of the matter were gone into, the Attorney-General, for the Crown, took the preliminary objection that, according to the terms of the petition itself, Dr. Hopkinson had sold his interests in the English and German patents to his co-petitioners for the sum of £19,750, which, it was submitted, was adequate remuneration for him as patentee. This being so, it was argued that the Company who had bought the patent right as a commercial speculation had no *locus standi* before the Committee, inasmuch as the favour of a prolongation of the term of a patent can only be properly claimed on behalf of the patentee personally, and not for any company to whom he may have parted with his interest in it outright. Strength was lent to this contention by a paragraph in the Westinghouse Company's own petition, which declared that "it is a meritorious action on the part of public companies to take up and assist inventors in developing inventions of great public utility; and that it is reasonable that if, through circumstances over which they have no control, they have not been able to obtain a sufficient remuneration for the moneys expended by them in developing the invention, their merit in undertaking the development of the patent should be recognized by an extension of the term of the patent, sufficient to enable them to obtain such reasonable remuneration." This assertion of the quality

of a meritorious action for what to ordinary mortals would appear to be a mere commercial speculation, did not go down with the Committee, who followed the Attorney-General's reasoning, that these very terms showed that the grant of the favour asked for would not benefit Dr. Hopkinson; and the petition was accordingly dismissed summarily.

The Attorney-General rested his case in this regard upon the decision of the Judicial Committee on the petition for the prolongation of the Bower-Barff patent. We are indebted to a leading article of the "Electrician" for the particulars of what our contemporary justly calls the "fateful plea" of the Westinghouse Company; but it is a disappointment to find this most important hearing so imperfectly reported in both the "Electrician" and the "Electrical Review," where one would reasonably expect the proceedings to be recorded in the fullest possible detail. Both journals, moreover, make nonsense of the Attorney-General's argument by stating that he quoted "the case of Bowerdorf," dated in "1885," as furnishing the precedent that an assignee of a patent will not be granted an extension of time unless the inventor himself is to benefit by it. As we have already stated, the case in point was that of the Bower-Barff petition, the result of which we reported just a twelvemonth ago—in the issue of the "JOURNAL" for July 23, 1895 (Vol. LXVI., p. 188). This petition failed; Lord Watson, in delivering their Lordship's judgment, observing that "there was no case to be found in which an extension had been granted to an assignee which did not directly or indirectly tend towards the benefit of the original inventor, who, had there been no assignation, would be in a position to claim the extension himself. . . . Their Lordships did not see any reason for departing from the principle already recognized in similar cases." Thus these two cases are exactly on all-fours with each other.

We are bound to take Lord Watson's statement of the law, although the "Electrician" quotes the Patents, Designs, and Trades Marks Act of 1883 for a definition of a patentee as "the person for the time being entitled to the benefit of a patent," and declares that extensions have from time to time been granted to public companies, as assignees. We do not see that the cited definition applies; and if the last statement is true, it seems to follow that in these cases some appreciable benefit must have been reserved for the original patentee. Mr. Fletcher Moulton, Q.C., for the petitioners, argued that the fact of Dr. Hopkinson having been presented with some shares in the Westinghouse Company did give him a beneficial interest in the success of the petition. Whether or not this interest would be regarded by the House of Commons as invalidating Dr. Hopkinson's vote on a matter affecting the Company, supposing him to be a member of Parliament, may be regarded as doubtful. It would certainly prevent him voting upon such a matter, if brought before a local authority to which he might belong. Yet it is not enough to win the favour of the Judicial Committee of the Privy Council. It is probably all a question of degree. If the Westinghouse Company were a concern formed for the principal purpose of exploiting the three-wire patent, and if Dr. Hopkinson's remuneration for his interest consisted largely, or even considerably, in shares of the Company, the case would be different. As it is, the Westinghouse Company purchased his interest in the course of their ordinary business, and did not become thereby to any appreciable extent a Hopkinson Company. Hence these tears. The moral of the story appears to be that patentees, in parting with their rights to commercial companies, should take care to reserve a position for themselves in the rare, but quite possible, event of a prolongation of the term of the patent being needed. Without this precaution, which could seldom become operative, the life of an assigned patent must be regarded as strictly limited to the original term.

GAS PHOTOMETRY: AS IT IS, AND AS IT MIGHT BE.

IT was a remarkable coincidence, to say the least, that led to the emphasizing of the academic discussion of photometrical questions at the recent Gas Institute meeting by the parliamentary proceedings on the Dublin Bill and the litigation at Birkdale. It is such proceedings as the latter that render the subject of photometry so perennially interesting to gas engineers. Men of science, electricians, and others interested for general or particular reasons in the measurement of the illuminating power of artificial lights, have occasion to use photometers for their own purposes; and very diverse are their notions of what constitutes a reliable photometric instrument, and the proper method of using it in order to obtain reliable results. The interest of gas managers in the same matter is of a totally different kind, not merely a difference of degree. To the gas manager and engineer, a photometer is first and foremost a statutory appliance for determining whether he does his work of gas manufacture in a proper manner; and this intrusion of the statutory element into gas photometry has necessarily had the effect of imposing upon the merely scientific operations a mass of complications and refinements which every now and then culminate in such overwhelming expositions as the parliamentary and police court proceedings already mentioned. It is reported of Lord Kelvin that, having to make a photometrical determination at a meeting of a scientific society, he proceeded to do it with the aid of a white card and a lead pencil; declaring at the time that these, and a measure of length, were all that is necessary for the purpose, and that the more complex apparatus of the scientific instrument maker is wanton superfluity. With all deference to this most illustrious authority, it may be remarked that if Lord Kelvin were a gas manager, and the photometrical question at issue were the quality of his illuminating gas sold to the public under statutory requirements in this regard, he would have told a different story. Circumstances alter cases, in this as in other affairs.

It is hardly necessary to remark that the question of what is proper gas photometry involves a large number of factors, every one of which is the subject of an extensive literature, and most of them also of long-standing and still active controversy. The latest additions to this literature are those to which reference has already been made. The photometry of gas, its regulation by statute, apparatus, and methods having been evolved experimentally, without reference to any settled order, it is only in accordance with this course of things that these last contributions to the advancement of knowledge should have been as unsystematic as those that preceded them. Our national way of legislating and adjudicating upon cases as they arise, has been productive of infinite confusion in many departments of business and social life; but the actual state of legal gas testing is a most conspicuous example in point. It is not too much to say that the expert evidence in the Dublin and Birkdale cases implies the severest condemnation upon the statutory and legal systems under which it was evoked.

It is the purpose of this article to place upon record what appears to be a rational deduction from these recent illustrations of the condition of the great gas photometry question, such as might be heard wherever two or three gas engineers meet together with the laudable object of solacing themselves with "shop" talk. First, as regards the photometer itself, it seems to be the general view that the familiar Letheby form of apparatus, in a suitably ventilated dark room of comfortable size, is to be preferred to any box-and-curtain arrangement, whether it take the form of an Evans or a wheelbarrow photometer, that can be recommended either on account of long use or some presumed handiness or economy of space. It is generally understood to be a delusion and a snare to take "shots" at a photometer disc with as little preparation as a photographer focusses his camera. Moreover, any photometer that goes wrong if the operator leaves a door closed a few minutes too long or for any similar cause, stands condemned as a scientific instrument.

It would be an ideal state of things, no doubt, if gas could always be measured and tested at the standard temperature and barometric pressure; because it is only then that a cubic foot of the commodity is actually a cubic foot. But since this ideal condition is not to be realized at all times, the next best thing is to compensate for it when the facts do not agree with the convention. How any man with the smallest pretensions to the possession of scientific knowledge could bring himself to argue that a gas need not be measured with regard to this compensation, is one of the mysteries of *expertise*. Science, after all, is but systematized common sense; and common sense, instructed in the physical nature of a gaseous body, must recognize that the masses of such a substance is a function of its temperature and the pressure under which it exists in confinement.

The photometry of gas is seen, as soon as the subject is looked at, to depend upon a number of conventions—some applying to the gas itself, others to the standard against which its illuminating power is measured, others to the form of the instrumental aids to the performance of the act of comparison. Common sense, again, suggests that the nearer these conventions are approximated to in practice the better. A candle of a particular description and rate of burning being the legal standard of light, and the mean light of a pair of candles being prescribed as the legal candle, it is obviously in the spirit of the regulations to employ two different candles—not one candle cut into two portions—and to choose specimens that burn as nearly as possible to the prescribed rate. Upon general principles, it must be better to avoid corrections, or to reduce them to the smallest proportions, than to rely upon them as a means of superseding the taking of legitimate pains in the selection of the correct thing.

Theoretically speaking, no such piece of apparatus as a "photometer" has any justification for its existence. Practically, something of the kind is necessary to facilitate the equalization of two lights upon a prepared screen, and the ready and correct measurement of the distance between them. Also, the operator wants a table for his accessory apparatus and his own work; and the lights must be screened from draughts, and interfering radiations prevented. This, of course, constitutes the scientific instrument maker's opportunity, of which these enterprising tradesmen have taken full advantage. It would be a good thing if some agreement could be arrived at as to what is indispensable in a photometer; but, in the meantime, the Letheby pattern is the most popular.

Then as regards that highly important piece of apparatus, the gas-burner. There is now no need to argue for the argand pattern for photometrical use. It is employed without exception for ordinary coal gas; and an important step towards the

attainment of uniformity of practice in this regard, upon a rational basis, was made when the so-called "F" London argand was legalized for Preston 20-candle gas. What is now needed is to systematize the argand pattern, as adapted to the different grades of gas supplied in various parts of the country, so that there shall be a burner of this kind available for every district, which will burn the local gas at the full statutory rate of 5 cubic feet per hour without giving the operator any trouble. The whole series of test burners would require to be approved and stamped by the Standards Department, and a short Act of Parliament passed to render their use optional for undertakers of gas supply.

Thus in at least one respect would order supersede chaos in gas photometry. Whatever view of the matter officialdom may take, the ordinary gas manager wants nothing more than to know what he is expected to do as regards the provision of gas of a certain illuminating power; and then he does it to the best of his ability. He has a grievance, however, when, as frequently happens, his working is compared with that of a neighbour who is not required to conform to the same standard of illuminating power, or, what is worse, whose standard is nominally the same but actually different. The latter condition is only too common; and it is unhappily something that the public cannot be expected to understand. It would be easy to find two adjoining towns in whose populations the customary neighbourly feelings exist, both supplied (say) with 19-candle or 20-candle gas. One town tests its own gas after the quite excusable fashion indulged in by Southport—that is to say, the argand burner that best suits the gas is looked up, and duly employed by an examiner who knows he will not gain the favour of his employers by finding unnecessary fault with the quality of the gas. In the other town, a flat-flame burner is used for gas testing, by an officer who entertains the opinion originally formed by certain gas agitators, that it is legitimate to use for this purpose the very worst burner that can be found, and also believes himself called upon to give the very worst account of the gas supply. If it is a correct reading of the law that 16 or 20 candle gas means gas which shows this quality upon the premises of any and every consumer in the district, then it follows that the conduct just cited is not so irrational after all; because it would mean that the gas must retain the specified illuminating power, not only after having passed through all the vicissitudes of the distributing plant, but after the consumer and his plumber and gas-fitter had also done their worst by it. However this may be, it is obvious that the circumstances of the gas managers subjected to these different conditions as to the testing of their manufacture must be widely dissimilar. Yet the price at which one could make gas would naturally be compared with that prevailing in the other town; and it would be impossible to convince a non-technical mind of the absolute injustice of such a comparison.

The argument comes to this: That the recently mooted doctrine of the propriety of supplying gas of the illuminating power that can be manufactured from the natural coal supply, without carburetting, must imply further that this illuminating power is to be ascertained by burning the gas by such an argand burner as shall be capable of consuming it at the rate of 5 cubic feet per hour, standard volume, to the best advantage. There is reason in the declaration that as a simple argand burner cannot increase the illuminating power of the gas, but can only educe it, fairness to the gas requires the selection of the best thing of the kind that art can produce. There can be no equitable rights in the imperfection of a burner, any more than in the shortcomings of a "photometer," that either party to the convention of gas testing can claim to perpetuate to the disadvantage of the other. The only safe ground is to accept the best thing that can be found, from time to time. Short of this, there is no logical halting-place. The standard burners and other photometrical appliances should be regularly overhauled —say, once in five or ten years—and any improvement in the disposition of the gas and air currents tending to improve the performance of the burner should be forthwith approved and made generally available in the statutory gas industry of the United Kingdom. Thus, gas photometry, though it would still be a convention, would have a sounder foundation and a more uniform practice than it possesses to-day.

The Proposed Amalgamation of Incandescent Gas-Light Companies.—A proposal has been on foot to amalgamate the De Mare and Meteor Incandescent Gas-Light Companies; but at an adjourned meeting of the former Company held on Thursday, the Directors reported adversely on the matter, and a resolution for voluntary winding up was passed unanimously.

Projected Gas Exhibition in New York.—The current number of "Progressive Age" contains the preliminary announcement of a gas exhibition to be held at the Madison Square Garden, New York, during two weeks early next year, probably in January. The superficial area of the main floor is 31,000 feet, of which 20,000 feet will be available for exhibits. This is the first exhibition of the kind ever attempted in America; and the project, which is in the hands of the Editor of the above-named publication (Mr. E. C. Brown), promises to be successful—one-fourth of the floor space reserved for exhibits having been already applied for.

NOTES.

The Fire Risk of Acetylene.

The subject of the commercial use of acetylene has so far progressed in the United States that an insurance expert gave his views on the matter at a recent meeting of the Philadelphia Fire Underwriters' Association. It appears that the United States gas companies are threatened with competition in a new form; their fresh rival being portable acetylene supplied in cylinders charged with the gas to the point of liquefaction. According to Mr. Chas. A. Hexamer, the expert in question, the suggestion is to supply these cylinders of compressed acetylene for connection with the internal gas-fittings on consumers' premises—replacing them when empty. The question has been asked as to what would be the probable effect of a fire in such a building reaching the acetylene cylinder; and also what would happen if the reducing-valve were to fail, and the initial pressure of the cylinder be thrown upon the gas-fittings. To the former query it has been replied that, while heat would undoubtedly cause an increased pressure in the cylinder of acetylene, long before the bursting pressure was attained the imprisoned gas would be decomposed into carbon and hydrogen, without explosion. Mr. Hexamer observes, however, that it remains to be proved that cylinders of liquefied acetylene can be overheated without disastrous results; while the danger of exposing common interior gas-fittings to a sudden pressure of 1000 lbs. per square inch need not be argued. Still, it is thought that the objection from these points could be overcome by keeping the cylinders outside buildings, and providing them with relief-valves discharging into the open air, in case the reducing-valve fails to act. Mr. Hexamer concludes, however, that it is too early to formulate rules and requirements for the safe introduction of acetylene gas for illuminating purposes; and he recommends that for the present the insurance offices should refuse the risk where it is proposed to be used.

The Hypothetical Ether.

Professor A. E. Dolbear has been lecturing before the Franklin Institute of Philadelphia upon the characteristics, determined and presumed, of the physicist's ether. He summed up the case for the ether in a very lucid manner, stating that this conception of something which is not matter, inasmuch as it is not subject to gravitation, was first started in order to account for the phenomena of light, which was observed to take about eight minutes in coming from the sun to the earth, and obviously needed something to carry it. Then Young applied the wave theory to the explanation of polarization and other phenomena; and, in 1851, Foucault proved experimentally that the velocity of light is less in water than in air, as it should be if the wave theory be true. This experiment has been regarded as extinguishing the corpuscular theory, and demonstrating the existence of the ether as a space-filling medium capable of transmitting light-waves at a velocity of 186,300 miles per second. It was first called the luminiferous ether to distinguish it from other imagined ethers, such as the electric, the magnetic, and so forth—as many, in effect, as there were different kinds of phenomena to be explained. Faraday put a stop to the invention of ethers by suggesting that the luminiferous ether might be the one concerned in all the different phenomena; and this idea was the foundation of Maxwell's work, which led up to the conclusion that light is an electro-magnetic phenomenon—that is, that the waves, which constitute light and waves produced by the changing magnetism are identical in their nature, are in the same medium, travel with the same velocity, are capable of reflection, and so on. This theory was experimentally proved by Herz. The ether has been studied in many ways. It must be illimitable, for us; or else light-waves would be reflected from its boundaries, and the whole canopy of the sky would be perpetually luminous. Investigation as to the minuteness of some waves, and the conditions of their production, has led to the conclusion that the ether must be non-atomic. It is also imagined as being continuous, frictionless, isotropic, homogeneous, elastic, rigid, incompressible, incapable of transforming its own energy, insensible to all nerves. Obviously, as Professor Dolbear remarks, "to describe the ether, there is evidently a necessity for appropriate terms, which, at present, we do not possess."

A Water-Cooling Arrangement.

An arrangement enabling users of steam or gas power in towns, or where water for condensing or cooking purposes is scarce or dear, to employ the same water over and over again, has been perfected by the engineering firm of Worthington, of Brooklyn, New York; and it formed the subject of a paper read by Mr. John H. Cooper before the Franklin Institute. The apparatus consists of a vertical scrubber, filled with tiles so disposed as to break up the stream of descending water, which is supplied by an ordinary Barker's mill distributor fed from the hot well or circulating pump of the engine. A current of air is sent into the bottom of the scrubber by means of a fan, which requires very little power for driving it. The proportioning of the surface of the water-cooler to the amount of cooling work it has to do, is the only feature which differentiates this arrangement from the design

of an ordinary tower scrubber as used in gas-works; so that there is not much originality in the pattern of the Worthington air-cooler, which can be erected by anybody who requires the accommodation. A particular sample described by Mr. Cooper, for dealing with the condensing water of a 1000-horse power steam-engine, is a tower 17 feet diameter by 31 feet high. The condenser pump circulates 1500 gallons of water per minute, and the fan is 9 feet in diameter, requiring 3 per cent. of the total power of the engine to drive it.

The Metallic Carbides.

Mons. H. Moissan reports at short intervals in the "Comptes Rendus" on the properties of the recently discovered and little known carbides. The behaviour of these bodies with water is of considerable technical importance; and a summary of the present state of knowledge on this subject may be of interest. Calcium carbide (CaC_2), barium carbide (BaC_2), and strontium carbide (SrC_2) behave similarly, and all evolve pure acetylene; aluminium carbide (Al_4C_3), beryllium carbide (Be_4C_3), and lithium carbide (LiC_2) give up methane only; while uranium carbide (Ur_2C_3) gives also liquid and solid carbon compounds. Manganese carbide yields equal volumes of methane and hydrogen; and cerium carbide, a mixture of acetylene, ethylene, and methane with non-gaseous hydrocarbons. Yttrium carbide (YC_2) and thorium carbide (ThC_2) yield mixtures of acetylene, methane, ethylene, and hydrogen, in which the acetylene predominates. Titanium carbide (TiC), molybdenum carbide (Mo_2C), the zirconium carbides (ZrC and ZrC_2), and the chromium carbides (Cr_3C_2 and Cr_4C), are not acted upon by water.

The Economic Rate of Flow of Water in Pipes.

Mr. George W. Tuttle states, in a communication to the "Engineering Record," that he has recently had occasion to investigate the economic flow of water in pipes, and, not finding what he desired in the sources of information to which he had access, he worked out certain data for himself. The considerations which he had in mind are as follows: As we diminish the size of pipe designed to transmit a given quantity of water, the velocity increases so rapidly that the power wasted in the pipes soon becomes excessive. On the other hand, if we reduce the velocity, and therefore the friction and power wasted, the size of the pipes and consequently their cost must be increased. It appears then that, to discharge a given quantity of water through a pipe at a minimum cost, a certain velocity of flow must be adopted, which fixes the diameter of the pipe. Taking these considerations into account, and adopting certain coefficients derived from his own practice, Mr. Tuttle found the following to hold good under average conditions and uniform flow:—

Diameter of Pipe. Metres.	Economic Velocity. Feet per Second.	Loss of Head per 100 Feet in Feet.	Discharge per Minute. Gallons.
6	1·78	0·2580	157·1
12	2·09	0·1600	736·6
18	2·34	0·1220	1,854·0
24	2·55	0·0990	3,602·0
36	2·92	0·0751	9,265·0
48	3·25	0·0612	18,301·0

The Dividend of The Gaslight and Coke Company.—We learn from the Secretary and General Manager of The Gaslight and Coke Company (Mr. J. W. Field) that the balance to the credit of the net revenue account will, subject to audit, enable the Directors to recommend the payment of a dividend for the half year ending June 30 last at the rate of 12¾ per cent. per annum, carrying forward a balance of £108,897 14s. 11d. The dividend is the same as that for the corresponding half of last year; but the amount then carried forward was £256,800. The working in the six months ending Dec. 31 last allowed the payment of a similar dividend, with a balance of £164,121.

Society of Chemical Industry.—The annual general meeting of this Society was held last Wednesday, in the hall of the Carpenters' Company, London Wall, and was attended by a large number of gentlemen interested in the chemical industry in London and the Provinces. Mr. T. Tyrer (the President) occupied the chair. The proceedings opened with a few words of welcome addressed to the gathering by the Master of the Company (Mr. E. Smith). The General Secretary (Mr. C. G. Cresswell) then presented the report of the Council, which stated that the number of members on the register was 2957, as compared with 2895 at the last annual meeting. The report was adopted. The President then delivered his Inaugural Address, in which he discussed various ways whereby the Society's usefulness might be made still more available for the benefit of applied chemistry. At the close of his address, the President presented the Society's medal to Mr. John Glover, the inventor of the tower which bears his name, and from which, it was stated, the chemical industry had derived enormous benefit. Dr. E. Schunck, F.R.S., was elected President for the ensuing year. At the invitation of the London Section, the members lunched at the Cannon Street Hotel; and the afternoon was spent visiting the Tower Bridge and other places of interest. In the evening, the members were received at the Mansion House by the Lord Mayor and Lady Mayoress. The meeting closed on Friday with a dinner at the Hotel Cecil.

TECHNICAL RECORD.

A STREET LIGHTING CONVENTION AT NEW HAVEN (CONN.)

In response to a request put forward by Mr. A. T. Hendrick, the Mayor of New Haven (Conn.), and certain of his colleagues—among them being the Superintendent of Street-Lamps (Mr. H. Hopkins)—a gathering of gentlemen interested in public lighting took place in the above-named city on the 18th and 19th ult. There was a good attendance; and the proceedings, which are fully reported in the current number of "Progressive Age," were of considerable interest. Alderman B. L. Lambert, the Chairman of the Lamp Committee of the New Haven Common Council, was called upon to preside. The first paper read was on "General Street Lighting," by Mr. Walton Clark. He was followed by the Hon. T. B. Persse, of Hertford (Conn.), who discoursed on "The Municipal Ownership of Gas and Electric Light Plants." Mr. F. P. Morrill, of Philadelphia, the General Manager of the Welsbach Street Lighting Company of America, read a paper on the subject with which the Company are identified. "Lights of the Future" were dealt with by the Hon. J. Macdonald; and the way to obtain municipal advantages was explained by Mr. Allen R. Foote, the Editor of the "American Reporter." Another journalist—Colonel N. G. Osborn, of the "New Haven Register"—took up the subject of "The Relation of Lighting Corporations to Municipal Corporations." "Lighting for Residential Streets" was the subject of a short address by the Hon. J. D. Dewell; "Electric Street Lighting" was treated at some length by Mr. M. J. Francisco; and Mr. H. Hopkins gave an interesting account of the "Evolution of Artificial Lights." The subject of municipal ownership was the one which gave rise to most debate. At the close of the discussions, the general officers were appointed as follows: President, Dr. B. L. Lambert, of New Haven; Vice-Presidents, Messrs. H. A. Knight, O. E. Green, and E. C. Thompson; Secretary, Mr. H. Hopkins; Treasurer, Mr. J. Booth. The officers with three members will constitute the Executive Committee. It was decided to confine the membership of the organization to city or town officers actually engaged in maintaining street lighting service; but the question of admitting associates was submitted to the Committee who are entrusted with the formation of a constitution and the drawing up of the necessary bye-laws. The meeting is to be an annual one.

THE GAS EXHIBITS AT THE BERLIN INDUSTRIAL EXHIBITION.

The following notes on the Gas Section of the Industrial Exhibition now open in Berlin, are compiled chiefly from the very capable reports of Dr. H. Lux which have appeared in recent numbers of the "Zeitschrift für Beleuchtungswesen." They will form a supplement to the brief notice contained in the "JOURNAL" for the 23rd ult.

The Gas Section of the Exhibition, thanks to the active co-operation of the German Association of Gas and Water Works Engineers (whose meeting was held last month in that city), is, as a whole, considerably superior to the other sections. An industrial exhibition should not only present a graphic delineation of the present position of an industry, but for the guidance of inventors, should indicate the lines on which the former advances have been made. The Gas Section at Berlin is fortunately replete with interesting historical exhibits; and in this respect it surpasses other sections in which the aim appears to be advertisement only. One unfamiliar with the gas industry will not derive the impression from it that an epoch-making invention has been the spontaneous product of the inventor's brain, but will see that every such invention has a long chain of precursors naturally leading up to it. At first sight, there might appear to be many links missing between the primitive pine-wood slip and the Welsbach light; but the Association of Gas and Water Engineers have prepared an exhibit of former lighting appliances which shows clearly the gradations from the earliest to the most recent means of producing artificial light. The torch, the wax candle, and primitive oil-lamps sufficed even till the beginning of the present century, when the scientific study of flame led to the argand burner and the use of a chimney, and the investigation of the process of combustion to coal gas lighting. The Berlin Exhibition has typical specimens of lighting apparatus from the earliest times. The gas exhibits begin with the London street burner of 1812, and contain all the important varieties up to the large Siemens regenerative burners. The more recent kinds are exhibited on the stands of the firms who supply them.

The incandescent gas-light predominates, and even the technically very interesting regenerative lamps are quite subordinated to it. There are exhibited a series of forerunners of the Welsbach burner. Some of them have special importance in respect to recent developments; and among these may be mentioned the Fahnehjelm comb for water gas, the Clamond burner, and the Lewis platinum cone for gas under pressure, which excites greater interest because the modern Popp burner is based on the same principle. The German Incandescent

Gas-Light Company, which owns the Welsbach patent rights, has a large space; but there is only one novelty among its exhibits. This is an incandescent spirit lamp of ugly proportions, and surpassed by those of rival firms both in elegance and utility. The best in construction is the Helios incandescent spirit-lamp; but it is somewhat expensive. The spirit-lamp is costly in use; and it is therefore satisfactory to find that the inventor has turned his attention to other hydrocarbon compounds, such as gasoline. Three incandescent lamps of different patterns for consuming this light petroleum are exhibited, and are said to cost no more for fuel than an ordinary paraffin lamp. In this section of the exhibition is also found Schülke's system of lighting with acetylene, which attracts much attention.

The production of coal gas and the application of the bye-products have advanced in recent years equally with gas-burners. The improvements in the methods of production have brought the yield of gas almost to the highest limit; and the aim is now to restrict as much as possible the amount of manual labour in the retort-house. Two ways of decreasing the number of men engaged there are available—viz., the employment of charging and drawing machinery, and the use of inclined retorts. Among German engineers, inclined retorts have perhaps more enemies than friends; but in many cases judgment has been formed on sentimental rather than on practical grounds. An instructive model of a setting of inclined retorts is shown from the Stettin Fire-Brick Works.

The advances in the application of gas to other purposes than lighting find illustration in several exhibits. The gas-engine is admittedly the cheapest and most convenient small motor; and Herr Körting has endeavoured to show that it can with advantage be substituted for the steam-engine in large electrical works. The Deutz Gas-Motor Works have a separate pavilion for the exhibition of the "Otto" gas-engines. The chief recent improvements in this engine have tended to compactness, better valve-gearing and igniting apparatus, and diminished gas consumption. The application of the gas-engine to locomotives by means of a reservoir of compressed gas is one of the most interesting developments of recent times; and the gas-motor car exhibited attracts much attention. Of more general interest are the appliances for the extended use of gas in the kitchen. Automatic prepayment gas-meters are also shown. There are many different patterns of water-heating appliances exhibited by various firms.

EXPERIMENTS ON THE DIMINUTION OF THE AMOUNT OF NAPHTHALENE IN COAL GAS.

A recent number of the "Gastechniker" gave an original contribution by Herr V. O. Keller, descriptive of some researches on naphthalene in coal gas which he had made. The following is an abstract translation of the article :—

The means hitherto commonly employed for preventing stoppages in mains from the deposition of naphthalene, such as the injection of gasoline, &c., have been of only temporary service in delaying that result. The power which gasoline possesses of taking up large quantities of naphthalene, suggested that a certain quantity of it might be carbonized along with the coal. To this procedure there were two objections—viz., its costliness and the danger. Therefore, the cheaper and less dangerous crude petroleum was tried in place of gasoline. A setting of seven retorts with old pattern mouthpieces was used. A 2-inch perforated wrought-iron pipe passed through the lid, and extended two-thirds of the length of the retort. Outside, the pipe was reduced to ½-inch, and attached to a U-tube and funnel, into which the petroleum dropped. When petroleum was led into the retort at the commencement of the distillation, the pressure of gas became too great. Therefore in later experiments it was not admitted until the second hour after charging. The petroleum supply was cut off at the end of the third hour; the charge being completely burnt off in four hours. About 14 gallons of petroleum were used per retort per charge.

The following were some of the consequences of the carbonization of petroleum in the retorts. An oily layer appeared on the surface of the water in the gauges of the station meter; and a viscous fluid, smelling strongly of naphthalene, was taken from the holder syphons. A holder which was not used on Sunday had a deposit of naphthalene crystals round its lower rim when it was again put into action. Crystals appeared at the valves, seals, &c., and on the plates of the holder; and finally the petroleum, saturated with naphthalene, reached the dial of the meter. It was evident that the petroleum attacked the naphthalene energetically, but deposited it in places where its removal could not readily be effected. Later, a thick liquid containing petroleum and naphthalene was removed from the street syphons. It seemed that much of this naphthalene had been previously present in the mains; and as a means of cleansing these, the petroleum proved very useful, though it did not appear to be efficacious in preventing the formation of naphthalene for any length of time. It had the advantage of enriching the gas.

Dr. Bunte has pointed out that naphthalene may be removed from gas by condensation, but at the risk of injury to the illuminating power. While the above trials were in progress, it appeared to the author that the nature of the purifying material used influenced the separation of naphthalene. The matter was investigated by leading gas through a small purifier, one side of which was of glass, into a glass tube cooled to 0°C., and thence to a burner. Six experiments were made, and the glass tube was thoroughly cleansed after each one. The purifier remained empty in the first; and a naphthalene deposit was noticed in the tube after some hours. The purifier was then partially filled with gasoline; and no trace of naphthalene was found in the tube in 36 hours. The gas burnt with a very luminous but smoky flame. With the purifier charged with lime, traces of naphthalene were seen in 24 hours. With Laming's purifying material, naphthalene was scarcely found in 24 hours. With another purifying material, consisting almost solely of hydrated oxide of iron, from a gas-works where stoppages in the mains were very rare, there was no deposit of naphthalene in 48 hours. With a mixture which consisted when dry of 17 parts of silica, 28·3 parts of alumina, 34·6 parts of ferric oxide, and 19·8 parts of soda, and in which the alumina and soda appeared to be present as insoluble silicate, the tube was completely choked with naphthalene in six hours.

These very varied results leave no doubt that the purifying agents used have a relation to the amount of naphthalene left in the gas; and the nature of the purifying material has evidently more bearing on the question of naphthalene deposits than was formerly supposed.

The Index to Vol. LXVII of the "Journal," January to June, 1896, is now ready; and, as usual, a copy will be forwarded post free by the Publisher, on receipt of a post-card from any Subscriber.

Bayley's Acetylene Gas Generators.—It is reported that steps are being taken to form a Company for developing Mr. J. C. Bayley's acetylene gas apparatus patents. In a circular which has been issued setting forth the advantages of acetylene as an illuminant, it is asserted that "it can be stored and distributed much in the same way as coal gas." It is hardly necessary to dilate upon the disastrous consequences that might ensue upon the taking of this statement literally.

Railway Station Lighting by Incandescent Gas-Burners.—The Western of France Railway Company have arranged with the French Incandescent Gas-Light Company for an installation of lamps fitted with their burners at their principal stations. Already the stations on the "girdle" railway (from St. Lazare to Auteuil) are provided with lanterns of the latest type, containing one or two Welsbach burners; and similar lamps are to be put up at all the more important stations of the Company. Something like 4000 lanterns will be required; and the system may possibly be extended.

Presentation to Mr. Stephen Carpenter.—An incident of a pleasing nature occurred on the 6th inst., when the employees and staff at the Bow Common works of The Gaslight and Coke Company presented Mr. Stephen Carpenter with a timepiece, thermometer, and barometer combined, as a token of their esteem and regard, upon his retirement from the Company's service. The presentation was made by Messrs. Chappell and Felgate, who are engaged at the above-named works. In expressing his sincere appreciation of the good feeling which the handsome and useful present manifested, Mr. Carpenter said he would value it as a memento of the pleasant relations which had existed between him and his fellow-officers and employees during his 46 years active service at the Bow Common works.

The Technological Examinations of the City and Guilds of London Institute.—We have received a list of the prize winners at the last examinations of the City and Guilds of London Institute. We gave a fortnight ago the list of successful candidates in "Gas Manufacture;" and the following are the names of those who were considered to be specially worthy of prizes: Ordinary Grade: First prize (the Salters' Company's prize of £1 and a silver medal), Mr. J. W. Mackay; second prize (the Salters' Company's prize of £1 and a bronze medal), Mr. J. H. Brown; third prize (a bronze medal), Mr. J. Power. In the allied subject of "Coal Tar and Coal Tar Products," prizes similar to the above were awarded in the Ordinary Grade as follows: First, Mr. H. Dean; second, Mr. A. Heap; third, Mr. Cresswell Milnes. The medals are given by the Institute.

The Autumn Meeting of the Institution of Gas Engineers.—We learn from a circular issued by the Secretary of the above-named Institution (Mr. T. Cole) that the autumn meeting will take place in Glasgow on the 17th and 18th of September. This early intimation has been given to enable members to make their arrangements; and as some may desire to extend their stay in Scotland, it has been decided that ladies may join the party. A complete programme will be issued in due course; but as the members will be the guests of the Gas Committee of the Glasgow Corporation, it need scarcely be said that every effort will be made by them, as well as by the President (Mr. W. Foulis), to render the visit both interesting and enjoyable. Large structural works will be in progress, and an inspection of these, and of the extensive cyanogen-recovery plant in operation, will, it is hoped, prove valuable. By way of relaxation, the finest pleasure steamer on the Clyde—the *Duchess of Hamilton*—has been specially chartered to enable the party to enjoy, at their own convenience, a cruise amid the charming scenery of part of the west coast of Scotland.

THE THIRLMERE AND VYRNWY WATER-WORKS.

At a recent Meeting of the Institution of Civil Engineers, two communications, dealing respectively with the works for the supply of water to Manchester and Liverpool, were read.

In the first paper, on "The Thirlmere Works for the Water Supply of Manchester," by Mr. G. H. Hill, M.Inst.C.E., the Longdendale system of works, which, before the introduction of Thirlmere water, alone supplied the city, was first briefly described. The drainage area of Lake Thirlmere, the new source of supply, is 7400 acres; but the scheme includes the taking of water from an additional area of 3600 acres. The geological formation is the lower silurian; and the water is remarkably clear, even in times of heavy flood. The mountains surrounding the lake are very precipitous, and the floods consequently very large. The rainfall varies between 100 and 137 inches in wet years; and between 60 and 80 inches in dry years. The quantity of water available for the city daily, after giving 5½ million gallons per day as compensation to the river, is estimated at about 50 million gallons. The area of the lake in its natural condition was 328¼ acres; but it will be raised by the dam to 793 acres. The capacity of the reservoir then formed will be more than 8000 million gallons, exclusive of water below the surface of the original lake, which was not available.

The water in the lake was impounded by a masonry dam, the foundations of which were carried well into the rock; the maximum depth being 50 feet below the bed of the river. It was constructed of concrete, in which large masses of rock were embedded; faced with heavy rock-faced masonry; and, to comply with the Act of Parliament, a public roadway has been made along the top. The discharge tunnel for carrying off surplus and compensation water was driven through the small isolated hill which rose on the centre-line of the dam. Upon it was sunk a shaft, in which the valves for controlling the water in the pipes laid in the tunnel were placed. The waste weir was constructed in the solid rock at one end of, and separate from, the dam; and a gauge basin, in which the compensation water could be measured, was provided. New roads, 7½ miles long, were constructed round the lake.

The aqueduct to Manchester is 96 miles long, 14 miles of which is in tunnel, 37 miles in cut-and-over, and 45 miles in iron piping. It starts at a circular straining-well, lined with concrete and 40 feet in diameter, into which the water is admitted from the lake through a tunnel about 100 yards long. Upon this tunnel, and adjoining the straining-well, is sunk a rectangular shaft lined with concrete, in which the valves controlling the supply are placed. A hydraulic crane is provided for lifting the strainers in the straining-well for washing; the valves also are worked by hydraulic power. The water, after leaving the well, enters the Dunmail Raise tunnel, 5188 yards in length. Some of the other long tunnels are the Moor Howe, 3040 yards; Nab Scar, 1419 yards; and the Skelgill, 1243 yards. Machinery worked by compressed air was largely used for driving the tunnels, which are lined with concrete sides and arching only where the nature of the ground requires it; but the concrete invert is made continuous throughout. Its internal width is 7 ft. 1 in.; and the height, 7 feet. The cut-and-cover portion of the aqueduct is constructed of concrete; the internal dimensions being the same as in the case of the tunnels. Manholes and ventilators are provided every quarter of a mile. The bridges are all masonry; and provision is made for emptying the aqueduct at convenient points. Throughout the tunnels and cut-and-cover, the inclination is 20 inches per mile.

Wherever the hydraulic gradient is intersected by valleys too deep to be crossed by bridges, five parallel lines of cast iron pipes are used, 40 inches in diameter. As a first instalment of only 10 million gallons per day is at present required by the city, but one of these pipes has been laid. They begin, in the case of each syphon, in a rectangular chamber, into which the concrete aqueduct discharges, and in which an automatic arrangement is placed at the mouth of each pipe to shut off the water from it in case of a burst. The total weight of one line of pipes, 45 miles long, is about 52,000 tons. The greatest care was taken in the manufacture, coating, testing, and handling of the pipes, each of which had a number cast on it, which was recorded, together with the tests applied, the dates, ultimate position on the aqueduct, and the name of the workman who made the joint. For turning angles, double-socketed bevel castings were used, about 12 inches in length, and varying between 1° and 10°. For larger angles, a combination of these bevels was used—a spigot-pipe 3 feet long being placed between each pair of bevels. All joints were made solid with lead, which was prevented from running into the pipe by a spring ring. The section of the lead was wedge-shaped, to avoid blown joints. The longest syphon—that crossing the valley of the Ribble—was 9½ miles in length; the greatest head of water being 427 feet at the crossing of the River Lune. At these crossings, the pipes are carried by three 70-feet arches, each formed of cast-iron ribs.

The number of valves on the 45 miles of piping was very large, and included stop-valves and air-valves, besides a large number of discharge-valves, for emptying the pipes at convenient places. The self-acting valves have fulfilled their purpose perfectly in the case of the few bursts which have occurred; the water being completely shut off. The mechanism is set in motion by the increased energy of the water due to its greater velocity in the event of a burst. A pair of heavy weights is thus released, and they close a disc-valve in the main; the operation being controlled and regulated by a cataract cylinder. An air vessel is provided to obviate shocks which might occur during the stoppage of the column of water. Means are also provided for charging the air-vessel. All stop-valves, self-acting valves, and reflux-valves are anchored—the latter in one direction only. Valve-houses have been built over the large stop-valves and self-acting valves, of sufficient size to cover the five lines of pipes. The roofs are of glass fixed in wrought-iron framing. Girders are arranged capable of carrying blocks and tackle for raising any part of the valves requiring repair.

The aqueduct delivers into a service reservoir at Prestwich, near Manchester, where a straining-well is provided with lifting and washing arrangements.

The works were let in nine, and the ironwork in eighteen, contracts. Portland cement concrete has been used throughout; the quantity being about 100,000 tons. The total cost of the works to the date of the opening (Oct. 12, 1894) was something like £2,800,000, including parliamentary expenses, which were exceptionally large. The complete scheme will cost somewhere about £4,400,000.

The second paper was entitled "The Vyrnwy Works for the Water Supply of Liverpool," by Mr. G. F. Deacon, M.Inst.C.E. The Vyrnwy reservoir, now known as Lake Vyrnwy, occupies the site of a post-glacial lake which has been filled chiefly with alluvial detritus to a height of about 45 feet above the original water-level. That level was maintained by a bar of rock at a narrow part of the valley such as is found in most glacial lake basins. On the removal of the dislocated or otherwise unsound rock in this bar, a sound foundation was met with about 15 feet lower; so that the deepest part of the foundation is nearly 60 feet below the ground-level. The height of the dam to the sill-level is 84 feet above the river; and the water-level above the lowest part of the foundation is 144 feet. Below the sill of the dam, and above the outlet to the aqueduct, Lake Vyrnwy contains 12,131 million gallons. Its area is 1121 acres, reduced to 1036 acres 10 feet lower. An average cross-section does not differ widely from a figure with a horizontal base 2000 feet wide, having over it a depth of water of 70 feet, and end slopes of 2¼ to 1.

The author drew special attention to the methods adopted for securing water-tightness, and showed by the results obtained from this structure and from a concrete culvert—the walls of which are only 18 inches thick—subject to a vertical pressure of water of 56 feet, that concrete may be made perfectly water-tight by avoiding the use of so much water as to render it incompressible when first placed *in situ*, and by ramming it until the jelly-like condition indicating incompressibility is obtained.

About 33 per cent. of the stones used in the dam weighed between 4 and 10 tons each. The hearting-stones were roughly dressed on their beds, but were otherwise left quite rough. The face-stones had rectangular faces; and no part of a stone was allowed to come within 1 inch of any other stone. The stones and rock were rendered scrupulously clean with wire brushes and jets of water under pressure. The foundation rock was drained, except within about 15 feet of the face, by numerous funnels carried up to above the back-water level; and the total leakage from the central 8000 square yards of rock foundation, including that through the dam, if any, amounted to about two gallons a minute. The specific gravity of the rock of which the dam was built was 2·721, or 170 lbs. per cubic foot; that of the concrete, when dry, averaged about 2·51, or about 156 lbs. per cubic foot; and that of the whole dam was 2·595, or about 162 lbs. per cubic foot—a figure ascertained by comparing the measured volume of the work with the total weight of the materials put into it, all of which were carefully weighed. Crushed rock was largely used in preparing the mortar.

The mode of securing water-tightness of the two culverts, 15 feet in diameter, through the dam was explained. The compensation water to the Vyrnwy and the Severn, of which it was a tributary, is 10 million gallons a day; and 40 million gallons a day in addition, during four successive days in each of the eight months from February to October inclusive. The modes of gauging were also set forth.

The aqueduct commences at a valve-tower standing in the deep water of the lake, provided with strainers of copper wire gauze, which are removed, washed, and replaced wholly by hydraulic machinery. The outlet-valves consist of a series of short cylinders standing upon one another so as to form a vertical pipe; and the joint between any pair of such cylinders is capable of being opened very readily by hydraulic pressure. Thus the water is drawn off at any level desired. The aqueduct is constructed for the passage of 40 million gallons of water per day or more, with the exception of the iron syphon pipes and some other portions not required until later; and every part of the work now constructed will pass the full quantity of between 13 and 15 million gallons daily required as the first instalment of water. The gradient of the aqueduct being from 4·5 to 6·87 feet per mile, cast-iron pipes under pressure have been used, except in the three tunnels constructed at the hydraulic gradient, and in certain special places where steel has been

employed. Throughout the syphons, the hydraulic gradient has been varied wherever it was economical to vary it, subject to the total loss of head amounting to whatever could be afforded in each case. All specially expensive parts, such as valves and pipes under heavy pressure or in tunnels, have been considerably reduced in diameter from that of the cheaper portions.

The filter-beds are at Oswestry, where a recording-gauge gives full information as to the variations in the water passing through the aqueduct from time to time. The five balancing reservoirs on the aqueduct were generally described by the author; and the Norton tank, where the balancing reservoir is at a height of 113 feet above Norton Hill, was more particularly referred to. The tank contains about 650,000 gallons, and consists mainly of a steel basin in the form of the segment of a sphere in tension, depending from a steel ring in compression, resting, through the medium of an expansion ring, upon the masonry itself.

The six river crossings, thirteen railway crossings, and six canal crossings, including the Weaver Navigation and the Manchester Ship Canal, were next described. The crossing under the River Mersey was the most difficult portion met with. The pipes had been originally intended to pass through the bed of the river; but parliamentary exigencies rendered it necessary to submit to a reference clause which resulted in a tunnel having to be constructed through ground full of water under a head of 51 feet. The work was, however, successfully performed by means of a shield; and it is now in every respect satisfactory.

REGISTER OF PATENTS.

APPLICATIONS FOR LETTERS PATENT.

14,900.—KIKOW, H., "Regulating contrivances for gas heating burners." July 6.

14,929.—SCHÜLKE, A. H. J., "Production and combustion of acetylene for illuminating purposes." July 6.

14,941.—STRACHE, H., "Odorizing substances for artificially imparting odour to gases." July 6.

14,942.—STRACHE, H., "Burners for incandescent gas-lamps." July 6.

14,943.—STRACHE, H., "Removal of sulphuretted hydrogen from gases or gaseous mixtures." July 6.

15,045.—BAKER, H. C., "Gas or vapour engines." July 7.

15,064.—REDFERN, G. F., "Production of acetylene." A communication from La Compagnie Continentale d'Eclairage par le Gaz Acetylène et ses Applications Industrielles. July 7.

15,105.—CRIPPS, F. S., "Fittings for gas-lanterns." July 8.

15,122.—HAVILAND, F. H., HOLLOWAY, A., COLLIER, J. B., and MURCH, W. H., "Generating acetylene gas." July 8.

15,126.—MELHUISH, A. G., "Cooling the cylinders of gas and oil vapour engines." July 8.

15,127.—MELHUISH, A. G., "Regulating or automatically controlling the speed and power of internal combustion engines, and connecting same to tricycles or other vehicles." July 8.

15,139.—ISAAC, G., "Rendering acetylene gas inactive when brought into contact with metals with which it forms explosive compounds." July 8.

15,160.—OLDENBOURG, E., "Preparing illuminant appliances employed in the production of light by incandescence." A communication from R. Mondos. July 8.

15,163.—GRIMSTON, G. S., and HOLMES, E., "Gas or oil motor engines." July 8.

15,167.—MEYER, M., "Incandescent light burners." July 8.

15,197.—HEYS, W. G., "Oil and gas engines." A communication from J. J. Heilmann. July 9.

15,203.—PEEBLES, D. B., "Coin prepayment mechanism for gas-meters." July 9.

15,214.—CLARKE, A., "Gas-governor." July 9.

15,229.—WRIGHT, J. W. B., "Heating-stoves for burning petroleum or gas." July 9.

15,267.—STILWELL, J. F., "Engines operated by gas, vapour, oil, or the like." July 9.

15,324.—SCHMID, C., "Impregnating fluid for incandescent mantles." July 10.

15,332.—NISARD, A. R., and SERIGIERS, A., "Incandescent mantles for gas and other burners." July 10.

15,343.—TILDEN, W. A., "Manufacture of oxygen from the atmosphere." July 10.

15,354.—MAIGNEN'S "FILTRE-RAPIDE" AND "ANTI-CALCAIRE" COMPANY, LIMITED, "Filters." A communication from P. A. Maignen. July 10.

Wolverhampton Corporation Water Finances.—The Water Committee of the Wolverhampton Town Council announce that the profit of the department for the year ending March 31 last, after paying interest charges on the capital and providing for the sinking fund, amounted to £4721, out of which £3000 will be transferred to the credit of the improvement fund.

Launceston Water Supply.—At the meeting of the Launceston Town Council on Monday last week, the Finance Committee brought up a report as to the aggregate expenditure on the new water supply from Carne Down. It appeared that the total approximate expenditure, including £970, the cost of the service reservoir site, and of the additional land at Windmill, including the cost of laying it out, was £10,874; and that consequently £874 in excess of the £10,000 borrowed would be required. The Committee recommended that application should be made to the Local Government Board for sanction to raise a further sum of £1000. The report was adopted, with the addition of £200 contemplated expenditure in the extension of the mains.

CORRESPONDENCE.

[*We are not responsible for the opinions expressed by correspondents.*]

The Testing of London Gas.

SIR,—I have read Mr. Livesey's letter in your issue of the 7th inst., and your editorial comments thereon.

I do not propose to deal with the suggestions made, that gas examiners have been employed by the controlling authority who were "incompetent and not impartial, and had an evident *animus* against the Company," as it is obviously impossible to sift a vague statement of that sort.

As to the accusation of "partiality" which Mr. Livesey makes against me personally, in terms to which I think I may reasonably take exception, unless Mr. Livesey intends to impute *mala fides* to me, the only ground on which he appears to base so grave an accusation is that I do not take the same view as he does of the meaning of the Acts of Parliament regulating the London Gas Companies. This difference of opinion is dealt with by Mr. Livesey in his letter, and is that, while he thinks that it is sufficient if the testing-places are so supplied with gas that the average of the three daily tests there made shows the quality to be of 16-candle power, I, on the other hand, consider that the words of the Act of Parliament saying "the gas supplied by the Company shall, with respect to its illuminating power," be 16 candles, means that consumers shall be supplied with gas of that power.

The difference is material, and for the following reasons: You will notice that Mr. Livesey in his letter intimates that if the gas is found on the first test to be below the standard, "the defect can be remedied at once," and it accordingly follows that, as the three tests have by law to be made at least an hour apart, a gas company on knowing (as they always can, and usually do) the result of the first test, could, if necessary, at once remedy any defect to the extent that the average of the three tests at the station would work out to the prescribed standard. It will thus be seen that the test at the station cannot be taken as an accurate criterion of the gas supplied to the consumers throughout the 24 hours.

The object of testing is, as Mr. Livesey and I agree, to protect the consumer. It appears to me to be the only object. I did, and I do, suggest that I am satisfied that tests made under the law as it now stands are not a reliable criterion of the quality of the gas supplied to the consumers, for the reasons I have indicated.

I am not sure whether Mr. Livesey intends to impute *mala fides* to me. But if he does not, it seems to me hardly courteous or justifiable to attribute partiality to me merely because I *bonâ fide* hold, and express, an opinion which differs from his own.

40, *Craven Street, W.C., July* 16, 1896. W. J. DIBDIN.

SIR,—Your leader and Mr. George Livesey's letter in the "JOURNAL" of the 7th inst., point out clearly the strained relations that at present exist with reference to gas-testing; and, as I am the oldest Gas Examiner in London, I beg that you will give me space in your columns for a few remarks.

You ask two questions: 1, What is the object of all this gas-testing, and what purpose is the gas-testing staff of the London County Council intended to fulfil? 2, Is it to make sure that London gets gas of the quality prescribed by the law, and demanded by the purchaser, or is it to catch the Companies tripping and extract fines from them? I think, Sir, if I repeat a short conversation, I shall at any rate answer part of your questions; and your readers can draw their own inference as to the remainder.

In the year 1870 (before the present Superintending Gas Examiner was known in connection with gas), the late Mr. T. W. Keates was appointed Consulting Chemist and Superintending Gas Examiner to the Metropolitan Board of Works; and I was appointed to succeed him as Gas Examiner at 17, Arundell Street, Haymarket. On the evening I commenced work, Mr. Keates met me, and made the following observations: "You are here to test the gas, and to see that the public get what they pay for. I believe the Companies are desirous of doing what is right; and if at the beginning of the testing you find the gas low, *at once* let the Company know, and they will put it right." This was the practice I adopted during my long service; and I am sure it resulted in great advantage to the public.

I would here remark that during my life I never met one in whom the instincts of a highly cultivated gentleman were more marked than in Mr. Keates. He respected not only his own rights, but also those of the Gas Examiner, the Gas Companies, and the public; and I can safely say that during his life the whole matter worked well and without friction. When Mr. Keates died, he was succeeded by the present Superintending Gas Examiner, whose whole action, from the time of his appointment, can only be described as "fussy." He had a habit of visiting the testing-stations without notice, and making all sorts of trivial complaints; and for years he has conveyed to me the impression that his chief object was to "trap" the Gas Companies.

With reference to the value of the testing-stations. The Superintending Gas Examiner has stated in his report to the Council "that the 16-candle gas only goes to the testing-stations," and that everywhere else it is about 14 candles. Granted this, I should contend that all the stations were worse than useless. This, Sir, is a serious statement for the responsible officer of the Council to make, seeing that nearly a million of public money has been spent on these stations. It appears from the report that this opinion was formed by the Superintending Gas Examiner, from the fact that he had made some experiments with a portable photometer, at Board Schools, Fire Stations, and other out-of-the-way places, and found the gas 2 or 3 candles below the standard. In my opinion, the so-called portable photometer is the most unreliable instrument in existence.

Some years ago I was appointed Public Analyst and Gas Examiner to a considerable town in the East of England. There was at the time a hot dispute between the Town Council and the Gas Company; and I was requested to test the gas, and report upon the matter. I

obtained from the late Mr. F. W. Hartley a portable photometer, which was set up in various places in the town. The plan I adopted was, to make a test with the portable photometer and then immediately to proceed to the works. On every occasion, I found the gas nearly 2 candles higher at the works, although I had every proof that the gas was the same. The late Mr. W. T. Fewtrell was in the town at the time; and he agreed with me that the portable photometer was most unreliable, and Mr. Hartley endorsed this.

You have stated that "most of the London Gas Examiners—we would like to believe it of all of them—are as independent and honourable gentlemen as they are able and experienced observers." Let us hope they are all you say; but my opinion is that most of the "able men" have thrown gas-testing up in disgust. For instance, Dr. Rideal, Dr. Hehner, Dr. F. Page, and Mr. Lloyd, are no longer thus engaged. The reason for this is not far to seek. No self-respecting gentleman could bear the "fuss" and "fads" of the present Superintending Gas Examiner.

J. VINCENT TAYLOR, F.C.S.,
Late Gas Examiner to the London County Council.

342, *Strand, W.C., July* 13, 1896.

Tunnelled Retort-Benches.

SIR,—The issue of the "JOURNAL" for the 7th inst. contains a description of an arrangement called the "tunnel" system of retort-setting, which is in use at the East Greenwich Gas-Works. I do not intend to discuss the merits or demerits of such a system, but content myself with stating that it is not new. I hold drawings of work executed long ago having this subway or tunnel arrangement, both in connection with inclined and horizontal settings of retorts. The horizontal settings have exactly the form of tunnel shown in the sketch accompanying the descriptive matter.

Gas-Works, Coventry, July 13, 1896. GEO. WINSTANLEY.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following progress was made with Bills last week:—

Bill read the first time, and referred to the Examiners: Barry Urban District Council Bill.

Bills read a second time: New River Company Bill, Staines Reservoirs Bill.

Bill reported: Kilmarnock Corporation Water Bill.

Bill reported, with amendments: Bournemouth Gas and Water Bill.

Bills read the third time and passed: Dalmeny and Kirkliston Water Provisional Order Bill, Eastbourne Water Bill, Sheffield Corporation Water Bill.

The Bilston Improvement Bill, the New River Company Bill, and the Staines Reservoirs Bill were referred to a Select Committee, consisting of the Duke of Westminster (Chairman), the Marquis of Bristol, the Earl of Coventry, the Earl of Portsmouth, and Lord Iveagh; to meet on Tuesday, July 21.

A petition against the New River Company Bill has been presented from the Hertfordshire County Council; and others against the Staines Reservoirs Bill, from the County Councils of Hertfordshire, London, and Middlesex. The Conservators of the River Thames have petitioned against alteration in the Staines Reservoirs Bill.

HOUSE OF COMMONS.

Tuesday, July 14.

METROPOLITAN COUNTIES WATER BOARD BILL.

Mr. COHEN asked the President of the Board of Trade, in the absence of the First Lord of the Treasury, whether he could give facilities for the second reading of the above-named Bill, which has passed the other House of Parliament; and, if it should be impossible to carry the measure through this session, whether the Government intended to introduce a Bill next year to arrange for the transfer of the water supply of the Metropolis from the Water Companies.

Sir F. DIXON-HARTLAND also asked the right honourable gentleman whether he was aware that the home counties interested were utterly opposed to the Bill, and desired to maintain the rights they already possess, and have control over their own water, and would give the most strenuous resistance to a measure which virtually placed them under the London County Council; and whether, under these circumstances, he would consider the advisability of withdrawing the Bill.

Mr. CHAPLIN: My right honourable friend the First Lord of the Treasury has asked me to answer these questions. In reply to the latter, I must guard myself against any adhesion to the proviso of the honourable member that the home counties interested are utterly opposed to the Bill in question; as my information would lead me to a rather opposite conclusion. In reply to the first question, it is obvious, in the present state of public business, that, unless the Bill was absolutely uncontentious, it would be hopeless to attempt to pass it into law during the present session. I do not propose, therefore, to proceed with the second reading. The Government, however, are fully alive to the importance of this question; and they hope to take an early opportunity of dealing with it next session.

THE GASLIGHT AND COKE COMPANY AND THE SUPPLY OF AUTOMATIC PREPAYMENT METERS.

Mr. J. STUART asked the President of the Board of Trade whether he was aware that The Gaslight and Coke Company had been supplying gas to small consumers by means of a special apparatus, but had now discontinued the supply of the necessary apparatus; and also that the South Metropolitan Gas Company were freely meeting the wants of this class of consumers; and whether he could take any steps to secure that equal facilities should continue to be given by The Gaslight and Coke Company.

Mr. RITCHIE: I am informed by The Gaslight and Coke Company that they have been, and are, supplying automatic prepayment meters, together with stoves and gas-fittings, at the rate of about 500 a week; that since July 1 last year the Company have supplied 31,462 customers; and that they have on hand orders which are being executed as quickly as the meter makers can deliver the necessary apparatus. The Company also inform me that some months ago, owing to the inability of the meter makers to furnish the Company with meters as fast as applicants were sending in their requests for supplies, the Directors, to prevent disappointment, found it necessary to suspend accepting any further orders until they should be in a position, with the aid of the meter makers, to promptly execute every order as and when received.

The following progress was made with Bills last week:—

Bill reported, with amendments: Redheugh Bridge Bill.

Bills read the third time and passed: Aldershot Gas and Water Bill, Barry Urban District Council Bill.

HOUSE OF COMMONS COMMITTEE ON THE LONDON WATER BILLS.

Monday, July 6.

(*Before Sir* J. PEASE, *Chairman; Sir* J. BRUNNER, *Mr.* BALDWIN, *Mr* BOND, *Mr.* J. STUART, *Mr.* BRIGG, *Mr.* FRY, *Mr.* LEES KNOWLES, *and Mr.* MUNTZ.)

SOUTHWARK AND VAUXHALL WATER BILL.

This Bill, which was to authorize the Southwark and Vauxhall Water Company to construct additional works, acquire lands, and raise more capital, came before the Committee to-day.

Mr. POPE, Q.C., Mr. LITTLER, Q.C., Mr. PEMBER, Q.C., and Mr. CLAUDE BAGGALLAY appeared for the promoters. The following were the petitioners against the Bill: The London County Council, represented by Mr. BALFOUR BROWNE, Q.C., Mr. WORSLEY TAYLOR, Q.C., Mr. FREEMAN, Q.C., and Mr. KEMP; the Middlesex County Council, by Lord R. CECIL; the Hertfordshire County Council, by Mr. WALTON, Q.C., and Lord R. CECIL; the Corporation of London, by Sir W. MARRIOTT and Mr. P. HENRIQUES; and the Conservators of the Thames, by Mr. J. D. FITZGERALD, Q.C. There were also petitions against the Bill from the Kent Water Company, the Uxbridge County Council, and others.

Mr. POPE, addressing the Committee for the promoters, said he had been much exercised in his mind during the weekly rest, as to how it would be best for him to put before the Committee the case of the Southwark and Vauxhall Water Company, and especially having regard to the fact that by this time every member of the Committee was as well acquainted with the general questions involved in these discussions as he was himself. He had come to the conclusion that he should best serve the interests of his clients by consulting the convenience of the Committee, and not by elaborately opening the case. He would simply put the Committee in possession of the scheme which it was proposed to submit to them, and allow the evidence to enter into the details. The first proposition he should endeavour to establish—he thought he should succeed in this, at all events—was that the Southwark and Vauxhall Company, or rather the consumers dependent upon the Company, must have more water. To what extent, of course, would be a matter of detail, which the evidence would reveal. The calculations of the Company had been based upon the wants of the district for a period covering some fifteen years, because that was the earliest time within which any further supply could be looked for. The Company were at the present moment distributing a very much larger quantity of water than the 24½ million gallons which, under the agreement with the Thames Conservators, they were entitled to take from the river. Unless they had power to get more water from somewhere, their consumers would run short, and that within a very limited period. The Company were in an unfortunate position with regard to the water they took from the Thames. They claimed, with reason, that they were not restricted by the statutes in the quantity of water they could take from the Thames; but they were limited by the agreements to the 24½ million gallons per day. From somewhere, however, they must obtain a supply which would enable them to meet the requirements of the district to the extent, at the present time, of something approaching 35 million gallons a day. The water consumers really meant a district containing something like a million of the inhabitants of the Metropolis. The claim the Company made to an unlimited supply from the Thames as required was disputed, and might be decided against them. In this event, what was to become of the water supply for the million people who had to be taken into account? This scheme, therefore, was to give the Company, as soon as it could be obtained, a supply of water which would, at all events, assist them in meeting their difficulties and requirements. Now, what did they propose to do? Leaving aside, unquestioned and undealt with, the power to take more water from the Thames, which, as he had said, was disputed, they proposed to deal with this particular case by asking Parliament to sanction the constructing of works which would give the Company a supply without any appeal to the water of the Thames. The first thing which they asked the Committee to sanction was the purchase of land and the construction of two pumping-stations in the neighbourhood of Rickmansworth—Haresfield and Springwell. They proposed to conduct the water, which would be from the chalk, by a line of pipes to the point of connection with their existing mains; and this supply would possibly yield them 10 million gallons per day. They also asked leave to acquire land, and to construct reservoirs for storage purposes, with the view that, if they obtained a supply of water from the chalk, they could dispense with drawing so much from the

Thames. This would give them a supply of water which could go to fill the reservoirs in case of emergency, so as to provide the storage which might equal their supply. That was shortly the whole of the scheme. It was a plan for pumping water from the chalk; and leave to be given for the construction of storage reservoirs, which would enable the Company to make available water obtained from the Thames, and which would equalize their supply.

The CHAIRMAN: There are two reservoirs, of about 50 acres each—what do they hold?

Mr. POPE: It is intended that they should contain 500 million gallons each—one a little less, I suppose, and the other a little more. Then, of course, there are the mains between the pumping-station and the existing mains, and the subsidiary work in connection with the reservoir; but that is the whole matter.

Mr. J. STUART: The reservoirs have nothing to do with the pumping-stations. They are two different things, are they not?

Mr. POPE: The reservoirs have nothing to do with the pumping-stations. We regard the reservoir in the chalk, so to speak, as sufficient for that particular water. The reservoirs in question would be utilized for the surplus of our Thames supply.

Sir *H. E. Knight*, the Chairman of the Company, was then called; and, in reply to Mr. POPE, said the section in the statute which defined the powers of the Company to draw water from the Thames was section 42 of the Company's Act of 1852. It was as follows: "That it shall be lawful for the Company, within the limits described on the said plans in that behalf, to obtain, draw, and impound water from that part of the River Thames, in the parish of Hampton, in the county of Middlesex, which is at or near the centre of the northern channel of the said river, at a point opposite to the eyot, called Platt's Eyot, for the purpose of supplying water within the limits, and for the purposes of this Act: Provided always that the works in the River Thames, or immediately connected therewith, shall be constructed according to a plan to be approved of by the Mayor, Aldermen, and Commoners of the City of London in Common Council assembled, and to be deposited at the office of the Town Clerk of the same city, and that such works shall be done and performed to the satisfaction of the Engineer for the time being employed in the Thames Navigation." There was no limitation. It was a general power to draw water from the Thames, for the purpose of supplying the district which was defined in the Act. Hitherto the Company had supplied their district with water abundant in quantity and excellent in quality. The maximum supply per head in the district was 44·48 gallons; and that, too, notwithstanding that every precaution had been taken to prevent waste. The Company were, indeed, foremost among the London Companies in their endeavours to stop waste; the whole district being under the Deacon system. In 1894, the Company obtained power to construct reservoirs adjoining their works at Hampton. They had used the utmost possible diligence in prosecuting these works; but they had had so much to do, that they had only just completed the reservoir commenced in 1891. They were now hard at work upon the two reservoirs sanctioned by Parliament in 1894, which, when completed, would hold 300 million gallons. These reservoirs, he had originally estimated, would give the Company sufficient water up till 1902 or 1903. In this, he had not been correct; and he had been compelled to modify his statement, in view of the experience of recent years. They had had two dry seasons and a very severe frost; and these facts he was bound to take into consideration. It was in order to meet the condition of things which experience showed they must be prepared for, that the present scheme had been projected. The evidence given in previous years before Select Committees and before the Royal Commission, required considerable modification in the light of the experience to which he referred. In 1911, the Company ought to have 1004 million gallons of water stored, to give a supply of 40 gallons per head per day for 20 days. But with the first of the two proposed reservoirs, they would only have 918 million gallons. In 1921, by which time they hoped to have constructed the second reservoir, they would come up to something like the storage they needed. They would have 1433 million gallons; and they ought to have 1418 million gallons. The present Bill was simply to complete the scheme of which the powers obtained in 1894 were an instalment. He was of opinion that water might be taken from the chalk to the extent of 50 million or 60 million gallons a day without injury to anyone. At present, the Company were endeavouring to augment their supply by pumping.

Cross-examined by Mr. J. D. FITZGERALD, witness denied that the Company, in pumping water from the gravel, were injuring the river. They took usually from 3 to 5 million gallons a day from the gravel. They had when there was a flood pumped as much as 35 or 40 million gallons, without injuring the flow of the river.

Mr. FITZGERALD: Did you take gaugings, to see whether or not you were affecting the flow of the Thames when you took 35 or 40 million gallons a day?

Witness: Yes; and I think we found that the river rose in spite of our pumping.

As you say, it was at a time of flood?—Yes.

Do you suggest that, if you carried out the same operation in dry weather, it would not affect the flow of the Thames?—We could not carry out an operation of that kind in dry weather. At such a time, the most water we could take would be 3 millon gallons a day. In my opinion, the pumping of this quantity from the gravel would not affect the flow of the Thames one iota.

It would affect the flow of the river to that extent?—It would affect the flow of the water in the gravel. There is a river flowing in the gravel as well as one above.

Mr. LEES KNOWLES: You say that the water from the upper strata does not flow into the lower strata?

Witness: Not at all.

Mr. FITZGERALD: In the paper you laid before the Royal Commission, the figures you gave were very different to those you have given to-day?

Witness: Yes; and I have told you the reason.

In 1891, you gave the consumption per head per day in your district as 28 gallons; but now you say it is 31·20 gallons?—Yes.—The figures were prepared by the Engineers; and they will be the best witnesses to explain the discrepancy.

How did the difference arise?—I suppose that, in the present case, water used for sand washing and the "slip" in pumping has been allowed for; but I am not certain.

In your statement before the Royal Commission, you said the well at Streatham might be relied on to supply 3 million gallons a day; but now you have cut that down to 2 million gallons?—Yes. When I made the former statement, we had not had experience of the well. We then calculated that it would produce 3 million gallons a day; but we find that we can only get 2 million gallons from it.

You said you had power to construct seven wells, from which you estimated that you would get 10 million gallons of water a day?—I think we mentioned these wells as possible sources of supply. We selected seven different sites, all within our own parliamentary district. We were trying to get water from the greensand; but as we found at Streatham that we could not, we have had to abandon the idea of the seven sites for getting this water. We now think that it would not be desirable to spend money on them. We are making borings at two of the sites; and we have the well at Streatham. But we have given up the other five; and we are now proposing to compensate ourselves for their loss by getting water from Haresfield.

Mr. LEES KNOWLES: You were proposing to go below the chalk?

Witness: Yes.

Mr. FITZGERALD: When you speak of boring below the chalk, you are referring to what you proposed to do in 1893?

Witness: Yes. We were seeking water far down in the greensand.

Cross-examined by Mr. FREEMAN, witness said that the Streatham well was the one from which a large supply was expected; but they were only getting 2 million gallons a day from it. A portion of the Southwark and Vauxhall district was overlapped by the West Middlesex Company, and another portion by the Kent Company. He did not know that the West Middlesex rates were "considerably" lower than those of his Company. They were lower as regarded the percentage; but the rates of one Company could not be compared with those of another. Per million gallons, the Southwark and Vauxhall Company sold their water at a far lower price than the West Middlesex Company. They both got water from the same source. He believed the Kent Company charged a lower price for water than his own Company.

Mr. FREEMAN: Do you suggest that, with your present sources, you will be unable to give a full supply in the near future?

Witness: I cannot answer that question, because it all depends upon the quantity we are entitled to take from the Thames. If this were unlimited, we should never see the end of our powers.

Then there is no hurry?—Not in that case; but our powers are doubtful.

Is this Bill being promoted on the contingency that you should prove wrong in your contention?—The Bill is being promoted in order that we should put ourselves in a position, no matter what otherwise occurs, to afford the necessary supply of water in the whole district.

If it turned out that you had power to take more water from the Thames, you would not want all the works under this Bill?—No doubt; but Parliament has expressed an opinion upon these matters that I feel bound to respect.

When?—In 1894 Parliament gave an instruction to the Committee on the Thames Conservancy Bill that the powers of the Water Companies to take water from the Thames should not be extended beyond what they were then.

Mr. J. STUART: It was "that nothing in this Bill should extend the statutory powers, or alter them." It did not affect the final quantity of water you took.

Mr. FREEMAN: Therefore, if that legal contention is right, you would have the Thames to take water from, and you would not want these further works?

Witness: If we can take any quantity we like from the Thames, of course we do not want to go anywhere else; but there are doubts of such a character that I think, being responsible for the supply of water to a million people, I am bound to look elsewhere.

And in order to be on the safe side, you propose to sink wells in Hertfordshire and Middlesex?—Yes. Of the amount of money we are authorized to raise, £750,000 is yet to be called up; and this is required for works already in progress.

Then what is the reason that, by clause 29 of your Bill, you take power to apply for the purposes of this Act any of the money which you have already been authorized to raise?—Because that is a clause that has always, as far as I recollect, been put in our Acts of Parliament. In the £750,000 referred to, is included expenses for extending mains and other purposes, which are annual expenses, and spread over a certain number of years. There may be balances left over, which will be applicable to new works.

Cross-examined by Mr. FITZGERALD, on behalf of property owners on the River Colne, witness said that the Company were actually in want of water at the present time. If they were limited to 24½ million gallons from the Thames, they were short now of something like 15 million gallons a day. If they got the supply of water from Haresfield, they would have a surplus from the Thames supply with which they could fill their reservoirs.

Mr. FITZGERALD: In clause 13 you say: "The Company may, from time to time, enter into and carry into effect agreements with any urban or rural district council, or any other local authority, or with any other company, body, or person for the supply to the Company by any such council, authority, company, body, or person as aforesaid of water in bulk." That is not limited in any way, is it?

Witness: No; it is a very valuable and very necessary clause, in the interest of the public, to have; because emergencies may arise when you may want to buy a few million gallons of water if you can get it from a neighbour, to save a calamity possibly.

Are you the Chairman or Director of any Water Company in Hertfordshire at present?—I am Chairman of the Rickmansworth Water Company, in Middlesex.

So that, in your capacity as Chairman of the Southwark and Vauxhall Company, you might contract with yourself, in your capacity of Chairman of the Rickmansworth Company, for supplying water in bulk to any extent, might you not?—If we urgently wanted water, I should contract with anybody I could get hold of to supply the necessary help; and that is the intention of this clause.

The object of the Bill, as I gather from your evidence, is to provide for the prosperity of the Southwark and Vauxhall Water Company for all time?—It is to provide for the requirements of my district up to the year 1911, with power to take land which will enable us to carry out a scheme for reservoirs up to the year 1941.

Mr. FITZGERALD said the petitioners whom he represented were owners, lessées, and occupiers of mills and other property upon the River Colne. It was alleged by these petitioners that the operations of the promoters, and the exercise of the unlimited pumping powers that they sought, would not only deprive them of the water that percolated into the Colne, but would have the effect of drawing water from the river itself.

Cross-examined by Mr. RIGG, witness said that in 1866 his Company came to Parliament to raise £300,000 of loan capital; in 1891, £300,000; and in 1894, £750,000. In the latter year, they took powers to make certain works, reservoirs, and so on at Hampton; and though not completed yet, these works were being vigorously pushed on. A reservoir holding 300 million gallons was well in hand, mains had been laid, and contracts were out for the pumping-station, and so forth. The £750,000 they had power to raise under the Act of 1894 was all appropriated, though it would not be paid away for many years. They were now raising the first £100,000.

Mr. BRIGG: Why, if these large reservoirs are necessary, did you not seek them in 1894?

Witness: Because in 1894 we came for what was urgently necessary. We explained to the Committee that urgency was great for that amount of reservoir capacity; and so impressed were the Committee that they put a special clause in the Bill that the works were to be carried out with all possible despatch. We have had experience since that time of very severe frost; and we plainly see that what we thought was sufficient then will not be sufficient now.

Surely, if large reservoirs are necessary, it would be cheaper to do it all in one job than to go for those works at Hampton, and then come in 1896 for works at Waltham?—No, it would not have made the slightest difference, because each scheme is by itself.

Do you say it is not cheaper to construct one or two large reservoirs than to construct a number of small ones?—No, I do not say that. We are making very large reservoirs at one place; and we are proposing to make another reservoir at another place where we can get land at a price which is desirable to obtain it for.

In 1894, the Committee put upon you, as a condition of raising your capital, that certain land at Battersea on which you have works was to be sold and treated as part of the capital. Have you sold that land?—No; we cannot sell it until we have the additional works constructed.

The CHAIRMAN: I have been looking through the figures, and I find that in July, 1895, you took from the Thames 36 million gallons on the average supply of the month. Did that include the Streatham well?

Witness: I think that is the total quantity supplied in the district. July, 1895, was the first month in which we took water from the Streatham well.

Did the Thames Conservancy Board remonstrate with you for taking so much water?—Yes; we have had representations from them on several occasions. They have threatened us with legal proceedings—indeed I believe they are commenced now.

Lord R. CECIL said the writ had been served; and he supposed in the ordinary course the action would be tried before the end of the year. The claim was for an injunction.

The CHAIRMAN: Have you the terms of the injunction?

Lord R. CECIL: Yes; it is an injunction restraining the defendant Company, their agents, or servants from taking, diverting, or impounding from the River Thames a greater quantity of water than 24 million gallons in every 24 hours, from midnight to midnight.

Tuesday, July 7.

On the resumption of the inquiry this morning,

Sir *H. E. Knight* was cross-examined by Mr. LEWIS COWARD, on behalf of the Kent Water Company. He said that clause 13 of the Bill was a very valuable one, giving the Company power to "carry into effect any agreements with any urban or rural district council, or any other authority, or with any other company, body, or person, for the supply to the Company by any such council, authority, company, body, or person, as aforesaid, of water in bulk." These powers were sought to meet contingencies which might arise at any time—such as the break-down of an engine or the bursting of a pipe, or other matters beyond human control. In the event of such a contingency, he would most likely get his Company first to ask the Kent Company if they could sell them water in bulk. No doubt, under the clause arrangements might be made to take water from the district of the Kent Company and convey it to that of the Southwark and Vauxhall Company. If it could be shown that what they proposed to do would be to the prejudice of the Kent Company, they would be quite prepared to agree to a provision giving them protection. By the Act of 1884 it was provided that the Southwark and Vauxhall Company should not, in the event of their at any time purchasing land situate in the Kent Company's district, be at liberty to supply water therefrom, nor from lands so situate supply any portion of the district now supplied by the Kent Company. It appeared to him to be quite fair that the Kent Company should have some proviso; but he did not see his way to give them the proviso they asked for over the whole of their district. He was aware that Uxbridge had been exceedingly badly off for water, and that the Rickmansworth Water Company had come to their assistance and abundantly supplied them temporarily. He was prepared to show that the Uxbridge wells could not possibly have become more and more depleted, as the wells at Rickmansworth did not affect those at Uxbridge. He was not cognizant of the fact that since his Company had been at work at Rickmansworth, the water in the Uxbridge wells had constantly subsided every year. As it was his business to supply the Southwark and Vauxhall district only, he was not at all prepared to subsidize the Uxbridge Company for water taken from their district.

Cross-examined by Lord R. CECIL, for the County Councils of Hertfordshire and Middlesex, witness said they proposed to make a reservoir and also to dig wells—that was the broad line of their scheme. The reservoirs were to be filled from the Thames, which would involve taking more than the 24½ million gallons.

Lord R. CECIL: So that if the Thames Conservators were successful in their action against you, you could not fill your reservoirs?

Witness: If it should be possible for the Thames Conservators to be successful in their contention, we have simply to come to Parliament, where we could get that rectified in a very few months.

The CHAIRMAN inquired if any of the water coming from Springwell or Harefield would run into these reservoirs, or whether it would flow eastward to the consumers.

Witness replied that it would flow straight into the mains, and thence to the consumers.

Lord R. CECIL: Why did you not join in the Staines reservoir scheme?

Witness: Because we objected to the Staines scheme as not being the most economical and best for our purposes. We should have to construct a conduit some eight miles long, at a cost of £28,000 per mile, the whole of which we save by our present scheme.

Lord R. CECIL: It is quite clear, is it not, that yours is not the scheme recommended by the Royal Commission?—I do not agree with you. I think it is the scheme recommended.

But they recommended the Staines scheme as far as reservoirs were concerned?—I think not. There were several sites before them; and that proposed in the Staines scheme appears suitable for certain reasons. Those reasons we have considered in selecting our site.

But you are going in the teeth of their recommendation with reference to wells?—Certainly not.

Then just let me call your attention to paragraph 100 of the Royal Commission report: "No doubt a large quantity of water could be collected by sinking wells and driving galleries in the chalk above the intakes. But any such abstraction would be at the expense of the springs and streams feeding the Thames, and would diminish proportionately the flow of the main stream in dry weather"?—That was dealing with water and wells in the Thames Valley.

But are not your wells in the valley of the Thames? No; they are in the valley of the Colne.

But surely the Colne is part of the Thames?—It is a tributary of the Thames. You will find that they specially allude to the chalk as a source of supply available for London.

They reject all the chalk, except the chalk of the Lea Valley?—No; because we in our two schemes of supply relied upon the wells for a certain portion of this supply, and we now are proceeding to carry out what we placed before them.

Are there not considerable wells adjoining stations that you propose to erect?—In the neighbourhood, yes.

Has not Mr. Webster got a lot of wells close to you?—Yes, he has wells, which are always overflowing.

The water of which he has been so long hawking about anxious to sell?—Yes, I believe so. The wells adjoin the Harefield pumping station.

Cross-examined by Mr. MAY, on behalf of Earl Percy, witness said that one tributary of the Colne flowed through the property of Earl Percy at Isleworth, and another through Hampton. An agreement was being arranged with the Hampton authorities, though no terms had been as yet settled. But whatever the terms given to the Hampton authorities might be, they would not be offered to the noble Earl.

Mr. J. STUART: You propose to have an addition of twice as much storage as you desired in 1894, do you not?

Witness: The storage we are asking for now is, roughly speaking, 1000 million gallons.

So that it would be, in all, three times as much as was proposed in 1894?—Yes, but in 1894 we were only asking for storage to last us to 1901, while now we want it to last us to 1911.

You have not yet carried out the works authorized in 1894?—No, but the new reservoir we undertook has been begun.

You say storage is required against floods and drought; and then you add the two together for the total storage. I do not follow how it is that you require the addition of those two?—Storage for drought is not required until the Company are taking a quantity of water from the river which might reduce the flow over Teddington Weir below 200 million gallons per day.

But I do not understand why you provide against both drought and floods in your reservoirs. Your storage is equal to about 19 days' supply. Do the floods and drought occur within such narrow periods of one another, that you have to provide in your reservoirs enough to meet such a contingency?—If they did so occur, it would be most unusual.

Why is it that you have to provide in your reservoirs enough capacity to meet both? I do not see why you should add those two figures? You are now upon a question which I cannot explain to you; but I am sure our Engineer will be able to do so.

I will not go into it. You found that you were using 44·48 gallons per head in 1895. When you calculate your future requirements, is it on this basis? It is calculated at 40 gallons per head, *plus* 10 per cent., for contingencies—that is, 44 gallons—this being the highest rate we have ever had.

Was not 1895 somewhat exceptional? Perhaps; but between 1876 and 1895 there are no less than four years where the maximum per head was nearly 40 gallons. Consequently, we ought to make provision for a possible demand of 40 gallons per head; and we think it is only fair to the public we should add 4 per cent. for contingencies.

So the scheme you have given us will enable you to take an average daily supply of 74 million gallons; and you are providing for 12 million gallons from these pumping-stations. In other words, it would be about 62 million gallons on an average from the Thames per day?—In 1941, if we did not meanwhile get water from other sources.

What is the maximum that you have pumped per day from the Thames gravel by means of the machinery which you have at your disposal?—At times of a very high flood, we can pump as much as 30 or 40 million gallons a day from the gravel.

Mr. BOND: You claim, do you not, by your statutory powers, to draw to an unlimited extent from the Thames?

Witness: I believe that is the case under our Act of 1852. It is section 42 of the Southwark and Vauxhall Act of 1852.

Am I right in supposing that, assuming your power of drawing *ad libitum* from the Thames were maintained, you would certainly not require any of the works asked for by this Bill?—We should certainly want the storage, to regulate the flow of the Thames and enable us to take our water entirely from our reservoirs during the dry season. It is absolutely necessary to preserve the minimum flow over Teddington Weir. The storage reservoirs which we are empowered to construct by our Act of 1894 are small compared to what we find from experience we ought to have. They only give us 448 million gallons; and in 1901, we ought to have 600 million gallons.

There is no scheme of compensation in connection with your plan—that is to say, there is no principle of compensation. You do not propose to restore at any period to the river water that you have once taken out?—No; and I do not think it would be found an economical thing to do.

At this point, the room was cleared; and on the re-admission of the public,

The CHAIRMAN said: We think it only right to say that we have had the advantage of hearing a very able opening address, and the evidence of an exceedingly intelligent and clear witness on the subject of this Bill; and we are all of the opinion—which I do not think could be very well varied by any engineering statement, after Sir Henry's evidence—that these works could be postponed without detriment to the interests of the public. In giving this intimation, I should say that we are unanimous in the view I have expressed; and that we think it will be a pity to go on with the case. It may be rather a rapid way of coming to a conclusion; but it seems to have impressed us all alike, and I felt it my duty to clear the room and tell you the conclusion at which we had arrived.

Mr. POPE: May I ask if the intimation now given covers the whole of the case? I may take it that it covers the question of the Harefield scheme, because that is a substantial scheme which might reasonably be postponed without injury to the public or the Company. With regard to the reservoirs, I think we might ask leave to bring evidence before you that this is a matter which cannot be postponed without injury, to some extent at all events.

The CHAIRMAN: I think we are fully convinced that the 300 million gallon reservoir has never yet been put into action. I do not want to argue the matter; but even Sir Henry Knight's evidence is that 200 million more gallons would suffice him till 1901.

Mr. POPE: Certainly, if you propose to restrict us to 1901.

The CHAIRMAN: We do not wish to restrict you any further than next year. You can make application then for these reservoirs, if you believe them to be necessary. We think they are works that can be postponed without detriment to the public interest. The preamble of the Bill is not proved.

LEGAL INTELLIGENCE.

Disconnecting a Gas-Meter.

Henry Hudson, a plumber, of Bradford, was summoned before the Bradford Bench last Thursday for an infringement of the Gas-Works Clauses Act, 1847, by disconnecting a supply of gas from the meter. Mr. F. Stevens, of the Town Clerk's Department, conducted the prosecution, and Mr. A. Neill defended. Evidence was given by the officers of the Corporation Gas Department to show that, on June 22, the meter was found to have been disconnected; the gas being conveyed direct from the pipes by means of an india-rubber tube. Mr. Neill submitted that there was absolutely no evidence against the defendant. Some irregularity had occurred in the gas supply during his absence from home; and the meter was innocently disconnected by his son, a boy of seventeen. After hearing evidence in confirmation of this view of the case, the Bench agreed that there was no proof of the defendant's connivance, and dismissed the summons.

Gas Consumption through Prepayment Meters.

At the North London Police Court last Thursday, Mr. Humphreys, Solicitor to The Gaslight and Coke Company, attended to support a number of summonses taken out by the Company for arrears of payment for gas consumed by means of automatic prepayment meters. He explained that when a penny was put into the slot, the valve allowed 25 cubic feet of gas to pass through the meter. Sometimes, however, more gas passed; and this was provided for by the usual dial register, which acted as a check on the penny-in-the-slot arrangement. On some occasions it happened that less than the 25 cubic feet had passed when the valve closed; but then credit was given to the consumer. One of the cases was contested; the defendant being Mr. J. G. Haines, of Median Road, Clapton. The evidence showed that in May last the defendant was residing in Percy Terrace, Hackney, and he signed a contract with the Company for a supply of gas on the automatic prepayment principle. This contract stipulated that the charges should be based on the quantity of gas registered by the index. From time to time the meter was examined, and up to November last there was a deficiency of 9s. 5d. A new meter was supplied; and when this was tested in January, it was found that there was 2d. more in the money-box than was accounted for on the register. The defendant was given credit for the 2d., and was now sued for 9s. 3d. Defendant said it was strange that the meter should register 9s. 5d. against him and only 2d. in his favour. He thought the gas must have wasted, or the meter must have been faulty. Mr. Bros said he was bound by the registration of the index; and he ordered the defendant to pay the amount claimed and costs. Similar orders were made in the other cases.

MISCELLANEOUS NEWS.

EUROPEAN GAS COMPANY, LIMITED.

The Annual General Meeting of this Company was held yesterday week, at the London Offices, Finsbury House, Blomfield Street, E.C.—Mr. J. BLACKETT GILL in the chair.

The SECRETARY and GENERAL MANAGER read the notice calling the meeting, and also the following report of the Directors:—

The consumption of gas at the Company's stations shows, in the aggregate, a slight increase compared with the previous year; but the total amount received for rental is a trifle less than last year, owing to various reductions having been granted, where circumstances appeared to render the same advisable in the interests of the Company.

Taking the stations separately, there has been an increase of 2¼ per cent. in the sale of gas both at Nantes and Rouen; a slight increase at Amiens and Boulogne; while Bolbec, Havre, and more especially Caen show a falling off in the consumption. The most strenuous efforts are being made to recover the lost ground at these stations; and the Directors hope soon to be able to report better returns there.

As intimated at the last meeting, a trial of prepayment meters has been made at Rouen and Bolbec. The results have been so far satisfactory; and, after further experience, the Board will consider the advisability of adopting the system at other stations.

The Directors have been able to renew their coal contracts at reduced prices; and thus effect a considerable saving in the cost of raw material.

The return for coke is only slightly below that of last year; but sulphate of ammonia again yields a decreased profit. On the other hand, tar has advanced considerably in value, and shows very satisfactory improvement.

Reference was made in the last report to legal proceedings pending between the Company and the Town of Nantes respecting certain dues it was sought to levy upon coal. The Directors have now the satisfaction of announcing that an amicable understanding has been arrived at with the Municipality, by which the question has been definitely settled, and the matter withdrawn from the Law Courts.

Additional outlay has been incurred at Nantes for the purchase of some property adjoining the Company's works; and considerable sums have been expended in supplying new consumers with fittings on hire at Havre, Nantes, and Rouen.

The Directors recommend the payment of the usual dividend—viz., 20s. per share on the fully-paid shares; and 15s. per share on those £7 10s. paid, less the interim dividend of 8s. and 6s. per share paid respectively on the 1st of February last. The Directors also recommend the payment of a special bonus of 1 per cent. on all shares, according to the amount paid thereon; and further, that the sum of £119 be taken from the reserve of undivided profits, in order to make up the amount required to pay the above dividend and bonus.

The CHAIRMAN said he was sure, after hearing the report and accounts read, the shareholders would not thank him if he detained them by a long speech. He would, however, just briefly allude to a few items in the accounts which possibly might possess interest for them. The gas-rental amounted to £235,262, which was a loss of £673, as compared with the previous year, or about ¼ per cent. This decrease was accounted for by the fact that they had such keen competition with electricity at most of their stations. The Directors believed that the most effectual weapon with which to fight the enemy was, of course, cheapness; and he also thought the incandescent burner was a very useful friend. But as the shareholders were all aware, the Company was conducted on different principles to the London Gas Companies. Although they were happy at all times to make a concession to any large consumer who would enter into a contract for a number of years, they were not able to supply gas at as low a rate as people obtained it at in London. The Company had now 42,050 stoves in use, which was an increase of 2000 in the year. They had also 301 gas-engines. The number of consumers was 33,434, which was an increase of 2381. Coal had cost them £2346 less than in the previous year; and for coke they had received £294 less. The latter was a very satisfactory figure, because, as many of the shareholders knew, coke had been a drug in this country, and very large quantities had been stacked; so he thought they might congratulate themselves upon showing such a small loss. It was partially accounted for by the fact that they had a large business in broken coke, as the French liked small coke for their stoves. Tar showed an increase of £961, which was very good; but, he was sorry to say, sulphate of ammonia had decreased by £1542. This was really beyond their control; sulphate having been selling very badly for the past year or so. They kept no stocks; but they generally followed the market, and sold at the time, which, he thought, was the best policy. With their large rental, the item of bad debts was only £375, which showed that their collectors did their work in an admirable manner. At Havre and other stations—but especially at Havre—they had latterly given up the system of deposits. They found that the Electric Light Company at Havre did not demand a deposit from their customers; and so the Directors had thought it wise to abandon deposits in the case of gas consumers. They had added 4 miles of mains to their distribution systems; making a total length of 451 miles. The profit amounted to £82,560, which was £823 more than in the preceding year, but £119 less than was required to pay the dividend and bonus which the Directors recommended should be declared. It was proposed to take the £119 from the reserve of undivided profits. All this was fairly satisfactory; but one would like to see the rental expand a little more. In France, however, electricity was a much more powerful enemy to grapple with than it was in this country; and, therefore, under all the circumstances, they must congratulate themselves that they came out as they had done. As the shareholders had been previously informed, they were compelled to go to law at Nantes, because the Municipality put an unjust tax upon the Company. They were so far successful in the first part of the battle that the Municipality came to them with the suggestion that they should make terms. It was much more agreeable to the Board to come to terms with a large Municipality like that of Nantes than to continue fighting; and they had done so under fairly satisfactory conditions—the amount they would have to pay not being anything like that which the Municipality originally demanded. Then, again, at the back of their works at Nantes was a street in which certain houses had been erected. Now these houses had certainly come to the works; and not the works to them. At certain states of the wind, the fumes from the gas-works

passed over this street; and the residents complained. People generally did not seem sufficiently wise to understand that the fumes from a gas-works were most admirable in their way as disinfectants—the world did not know its greatest benefactors. (Laughter.) So the people there whipped in a writ, and tried to get compensation for damage done. The Directors thought the best course was to purchase one of the houses which abutted on the Company's works at a sum which would pay about 4 per cent. Knowing that juries did not, as a rule, regard gas companies with any special favour, the Directors thought it best to meet their adversaries quickly. Two or three other tenants had complained; but their claim, which was a comparatively small one, had been settled. At Caen, a very unfortunate accident had occurred in their sulphate of ammonia works, whereby one workman lost his life. The French authorities insisted upon an inquiry being held; and it was a great satisfaction to the Directors to learn that the Company, through their Manager, were not found guilty of any negligence. They were doing their best to give a liberal compensation to the unfortunate woman who had lost her husband. Misfortunes, it was said, never came singly; and so it seemed in their case, for their foreman at Caen went out of his mind, and had to leave the Company's service. This, together with the bad business at Caen, had produced a trying time for their Manager there. At Rouen, things had been much more successful. There they had 800 coin meters in operation, and a chance of considerably increasing the business. As he had told the shareholders on a previous occasion, coin meters were not likely to be so popular in France as they were in this country, because for 10 centimes a French workman could not get so much gas as an English workman for a penny. The Company, however, would no doubt do a good business in the future in this direction; and the Directors would certainly continue to do all they could to forward this system. It was the practice of the Company to require the Managers to reside upon the works. The Manager's house at Rouen, being small and inconvenient, and occupying land which was required for extension of the offices, the Directors had decided to build a new one, at a cost of £1600 or £1700. As some of the shareholders might have noticed, a census had lately been taken in France. The returns showed that at Nantes, there had been a decrease in the population of no less than 17,000 in the last few years. Boulogne remained about stationary; Havre showed an increase of about 1000; and at Rouen there was a loss of about 2000. These were rather suggestive figures. They did not like to lose any of their consumers; and one could not but be surprised at the great progress they had made in the face of these decreases of population. The Directors had entered into contracts for coal at a cheap rate; and therefore he did not see any reason why, with an increasing business, they should not have a good year before them—indeed, he thought one and all might congratulate themselves that they were proprietors of a Company in such a sound and healthy state. Before concluding, he ought to mention that one of the Directors (Mr. E. T. E. Besley, Q.C.) and the General Manager had this year visited the various stations; and everything was found in a perfectly satisfactory condition.

Mr. N. E. B. Garey seconded the motion, which was at once unanimously carried.

The dividend and bonus recommended having been declared,

The Chairman moved the re-election of Messrs. N. E. B. Garey and H. C. Smith, who retired from the Board by rotation.

Mr. Besley, Q.C., in seconding the motion, said mention had been made of the visit which he had paid to the Company's stations. He could assure the shareholders that the condition of the works was most satisfactory; and their excellent Managers showed the utmost enthusiasm in the promotion of the Company's interests.

The motion having been carried,

A Shareholder expressed the opinion that it was not necessary for the Company to purchase the property at Nantes referred to by the Chairman, seeing that the works were erected before the houses.

Mr. Besley, Q.C., replied that he had seen the locality very recently; and the house was situated within the prescribed limit from the works—that was to say, 30 metres—which enabled the owners to enter a claim in respect of damage to their paint. In his opinion, it would have been a very imprudent thing to go to law.

On the proposition of Mr. A. T. Eastman, seconded by Mr. A. Skaife, the retiring Auditors (Messrs. J. Reeson and F. M. Fry) were re-appointed.

The services of the Directors were heartily acknowledged, on the motion of Mr. H. D. Ellis, seconded by Mr. J. Soutter; and afterwards a vote of thanks was accorded to the officials and staffs at home and abroad.

This concluded the proceedings.

THE GAS QUESTION AT BIRKDALE.

The Magistrates' Decision to be Appealed Against.

At the Meeting of the Southport Town Council last Tuesday, the resolution of the Gas Committee instructing the Town Clerk (Mr. J. Davies Williams) to take the necessary proceedings to appeal to the High Court of Justice against the decision of the Birkdale Magistrates in the cases reported in the "Journal" for the 30th ult., where the Corporation were fined £10 and costs for failing to supply gas of the prescribed illuminating power to the Birkdale District Council, was confirmed. The following resolutions of the Gas Committee were withdrawn: "That the Gas Manager be, and he is hereby instructed, to increase, from and after this date, the illuminating value of the gas so as to comply with the requirements of the Act of Parliament as interpreted by the Birkdale District Council;" "That, from and after the 1st day of August next, the price of gas in Southport be 3s. 3d., and in Birkdale 4s. 3d. per 1000 cubic feet." In the course of a short discussion on the matter, it was stated that there was a desire that an amicable settlement should be come to between the parties in regard to the future. On the same day the Town Clerk appeared before the Magistrates at the Birkdale Police Court to give his recognizances to appear before the High Court of Justice for the purposes of the appeal. The necessary formalities were gone through, and the sureties fixed at £100.

METROPOLIS GAS SUPPLY.

Dr. A. W. Williamson's Quarterly Report.

The following is an extract from the report of Dr. A. W. Williamson, F.R.S., the Chief Gas Examiner for the Metropolis, on the quality of the gas supplied during the quarter ended the 30th ult.

I. *With respect to Illuminating Power.*—The average in standard sperm candles at each of the testing-places was as follows:—

The Gaslight and Coke Company—	
106, Fenchurch Street, E.C.	16·5
10, Kinghorn Street, Cloth Fair	16·6
1, Dorset Buildings, E.C.	16·7
21, Millbank Street, S.W.	16·5
123, Ladbroke Grove, W.	16.6
3, Vincent Terrace, N.	16·6
1, Carlyle Square, S.W.	16·2
170, Camden Street, N.W.	16·3
14a, Graham Road, Dalston	16·6
47, Kingsland Road, N.E.	16·8
Spring Gardens, S.W.	16·4
1, Vinery Villas, St. John's Wood	16·3
116, Lambeth Road, S.E.	16·1
121, Hornsey Road, N.	16·4
66, George Street, N.W.	16·3
Commercial Gas Company—	
6, Wellclose Square, E.	16·3
24, Parnell Road, E.	16·1
South Metropolitan Gas Company—	
104, Hill Street, S.E.	16·7
37, Bedford Road, Clapham	16·2
1, Stoney Lane, Tooley Street	16·8
180, Lewisham Road, S.E.	16·2
99, Blackfriars Road, S.E.	16·6
211, Burrage Road, S.E.	16·4

It will be seen from these results that the average illuminating power of the gas made by the Companies has been higher than the parliamentary standard of 16 candles at all the testing-stations.

II. *As regards Purity.*—Sulphuretted hydrogen was not present in the gas. The average amount of sulphur in other forms than this was considerably less at all the testing-stations than the quantity permitted, especially at the Millbank Street and Ladbroke Grove stations of The Gaslight and Coke Company, both stations of the Commercial Gas Company, and the Hill Street station of the South Metropolitan Company, where it amounted to less than half the limit allowed—viz., 17 grains. Ammonia was generally present in the gas at all the testing-places, but only in slight quantities. The limit was not exceeded on any occasion during the quarter.

ELECTRIC LIGHTING NOTES.

The electric light battle at the Newington Vestry has broken out afresh. When, on Wednesday, the 8th inst., the Vestry considered the statutory notice from the County of London and Brush Provincial Electric Lighting Company, Limited, of their intention to apply to the Board of Trade for a Provisional Order, a motion that no opposition should be raised by the Vestry was lost on a division by 40 to 13. The following recommendation of the Special Electric Lighting Committee was then discussed: "That Messrs. Kincaid, Waller, and Manville be engaged for a fee of 50 guineas to prepare a report, dealing with the system of electrical distribution best adapted for Newington, the capacity of the station, the capital cost, the distributing-mains, the revenue reasonably to be derived, the cost of maintenance, statistics from all municipal undertakings to date, and all necessary assistance in making a fresh application for a Provisional Order, should the Vestry decide to apply to the Board of Trade for same; and in the event of such application being made, and a Provisional Order sanctioned by Parliament, such fee of 50 guineas to merge into the usual 5 per cent. for preparation of plans, specifications, and supervision of works to be carried out under the Order—it being distinctly understood that the only extra fees payable in excess of the agreed fee will be in respect of attendances in the event of a local Board of Trade inquiry, and the ordinary out-of-pocket expenses for telegrams, cab fares, postages, and such like expenses." To this recommendation, Mr. R. C. Davis moved an amendment to the effect that, after the recent *exposé* at the Board of Trade inquiry, no further action be taken in the matter. After several divisions and an angry debate, the new Progressive majority on the Vestry defeated this amendment, and agreed to the original recommendation by 43 to 13. Thus, in spite of Major Cardew's adverse report, and the Board of Trade refusal to proceed with the Vestry's original application, the Progressives are determined to "peg away" at their expensive hobby with the ratepayers' money. If, however, the ratepayers choose to elect these gentlemen, and relish their money-spending propensities, why should outsiders interfere?

In 1894, the Redditch District Council considered the advisability of adopting the electric light; but they were not then satisfied that it would be wise to do so. The question has again been brought to the front by the Manchester Edison-Swan Company announcing their intention of applying to the Board of Trade for a Provisional Order to empower them to supply the district. The Council are now of opinion that since 1894 it has been pretty well demonstrated that such enterprises "pay well;" and they have therefore resolved to apply for an Order on their own behalf. The approximate cost of a scheme for the town is estimated at £7856.

The Wolverhampton electric lighting undertaking has been in full working order for rather more than a year; and financially it has been successful. On March 31 last there were only 113 consumers connected to the mains—representing an equivalent of 8941 8-candle power lamps; but these numbers are increasing. Including the supply to the public lamps, the quantity of electricity used was 191,701 units. The total capital borrowed on March 31 was £32,331. The income

from all sources in the year was £4094; and the expenditure came to £2509—showing a profit of £1585, which is equal to 4·9 per cent. on the capital. The interest payable for the year amounted to £975; leaving £610 to be transferred to the redemption or sinking fund. The total amount due for the year on sinking fund account is £851; so that a deficit of £241 in respect to the sinking fund is the actual financial outcome of the first year's operations. The Electric Lighting Committee were congratulated on this result at the meeting of the Council yesterday week. The Mayor (Alderman C. T. Mander) also pointed out that no town, with the exception perhaps of Manchester, had made a profit during its first year's working; while many towns suffered big losses. According to the comparative cost of gas and electric lighting, he mentioned that, in the case of a large consumer—a member of the Council—gas at 2s. 9d. per 1000 cubic feet cost him 19s. 7d. per burner per annum. His electric lighting bill for the year ending March last averaged 19s. 3d. per light.

The Torquay Town Council proposal for spending £23,000 upon a scheme of electric lighting does not commend itself to the general body of the ratepayers, especially as there is a project on foot for laying out £13,000 on drainage works. If there were a great demand for the light, the scheme might be justified; but this does not appear to be the case. The ratepayers, who, of course, will have to bear any loss that may follow the enterprise of their representatives on the Council, have publicly protested; and they have carried their protest to the Mayor. The scheme has been prepared by Mr. W. H. Trentham, who estimates that the cost of the plant for 4000 16-candle power incandescent lamps and 70 arc lamps will be £22,000. Charging for the current at 6d. per unit, and taking the consumption at 13 units per 8-candle lamp, he reckons the annual revenue at £4322; or with the addition of £519, the cost of the gas-lamps in the roads and on the pier, and £150 for meter-rent, £4991. He takes 6d. per unit as being approximately equal to gas at 4s. 5d. per 1000 cubic feet; but he says that, in actual practice, it is equivalent to about 3s. Mr. E. Manville approves of Mr. Trentham's scheme, and considers that the revenue has been under rather than over estimated. This is all very well from the electricians' point of view; but some of the ratepayers are sceptical. At a recent meeting, one of them pointed out that Eastbourne, with an outlay of £44,000 on electric lighting, could only get £5600; and he very properly wanted to know how Torquay was going to earn the promised revenue when there would be no customers for the light beyond a few hotels. He asserted that, even if the scheme were successful, there would be no profit to go in reduction of the rates; while if it were only half successful, they would lose £2000 or £3000 a year; and in the event of an utter failure, there would be £4000 annually chargeable upon the rates. Put another way, if the thing succeeded, they got nothing; if it were partially successful, 2d. or 3d. in the pound would be added to the rates; and if it turned out a failure, they would have to pay a further 8d. in the pound. This prospect did not appear to the speaker to be good enough to justify them in supporting the scheme. Another speaker pleaded the cause of the poorer burgesses. He said he should be glad to see a private company introduce the electric light, because the ratepayers would then get the advantage. Out of 28 private electrical lighting undertakings, 19 were worked at a loss. The town must spend £34,000 on works of absolute necessity; and surely this was enough. A member of the Council who was present thought the time had passed for holding a meeting to protest; and as to the amount to be spent, he said the Council did not intend to lay out the £23,000 all at once, but would more likely start with £1000. These remarks were received with hisses and laughter. The application made by the Council to the Local Government Board for sanction to the raising of the necessary money for carrying out the electric lighting and drainage works formed the subject of a long inquiry on the 10th inst., by Colonel Durnford, R.E., when very strong protests were made against the former scheme.

There was a little breeze at last Tuesday's meeting of the Bury St. Edmunds Town Council, over the old point as to the voting rights of members who are shareholders in the local Gas Company upon electric lighting questions. The late Town Clerk had expressed his opinion that, in matters in which the interest of the Gas Company was concerned, those members financially interested in the gas-works ought not to vote on questions affecting the lighting of the borough. But the present Town Clerk (Mr. C. E. Salmon) had given an exactly contrary opinion. On the introduction of the report of the Electric Lighting Committee upon the proposed scheme for the town, Alderman Lake announced his intention of testing the validity of the votes of any Directors of the Gas Company who might take part in the division. It was thought by Mr. Bankes Ashton that Aldermen Lake's remarks might be regarded as intimidating the Gas Directors; but Alderman Gough repudiated such an idea. However, Mr. Ashton considered Alderman Lake's intention had been sprung upon the Council; and he inquired whether he was acting as the mouthpiece of some body of electrical engineers. Mr. C. Oliver accused the Directors of feeling a bit nervous. This Mr. Hooper indignantly denied; and he said it seemed to him that a section of the Council sought to ruin the borough and damage the gas-works. Alderman Lloyd intimated that the Directors had decided not to vote on the matter. Alderman Lake was further pressed as to whether he was acting in the interest of a board of electrical engineers; and he made the peculiar reply that he would give a cheque for the expenses if Mr. Ashton had any doubts about them. Mr. Turner moved the adoption of the report, which recommended the carrying out of a scheme at a cost of about £20,000. Resolutions passed by the Ratepayers' Association, protesting against what was characterized as extravagant expenditure, were read by the Town Clerk; but the protest was unheeded. On the division being taken, thirteen members voted in favour of the resolution, three in opposition, and six were neutral.

Elland Edge Water-Works.—It is reported that the Directors of the Elland Edge Water Company have come to terms with the District Council for the transfer of their works. The matter has been in abeyance for a considerable time, as the Company held out for a price much in excess of the Council's original figure.

THE LONDON COUNTY COUNCIL AND THE WATER QUESTION.

Sources of Supplementary Supply.

At the Meeting of the London County Council last Tuesday—Sir A. ARNOLD in the chair—the report of the Water Committee on the sources of supplementary supplies of water for the Metropolis, which was presented on the 9th ult., was again brought up. In the course of the report, the Committee stated as follows:—

"On the 21st of April, the Council passed the following resolutions: '(1) That it is in the interests of London that the requisite augmentation to its supplies of water, to meet the needs that may ultimately be felt, should be derived from some source other than the Rivers Thames and Lea. (2) That the valleys of the Usk, the Wye, and the Towy, with their tributaries, furnish a suitable area, from some part of which supplies might be derived. (3) That the Usk and Llangorse section of the Welsh scheme, as set out in the report, should be undertaken in the first instance.' And on 19th of May, the Council passed resolutions instructing us to continue our inquiries, and to complete by July 31 the engineering plans and sections alluded to in the Engineer's report, and necessary for the purposes specified in our report, and authorizing us to expend a sum of £2500 in carrying out the above-mentioned instructions; no part of the expenditure so authorized being incurred in referencing or preparing that information with regard to owners, lessees, and occupiers, which the Standing Orders of Parliament require. We do not think it necessary to set out again the details of the scheme which we propose the Council should obtain powers to carry out. These were explained very fully in our report of Jan. 31 last, discussed by the Council on Feb. 25 and April 21. There are, however, certain engineering and other details that may require reconsideration; and we shall give our most careful attention to these matters during the preparation of the Bills. We intend also, as soon as possible, to obtain other engineering advice upon the whole scheme; and for this purpose have ordered that the services of two eminent Engineers be engaged, whose opinions we will in due course report to the Council. We do not wish to press the Council to come to an immediate decision upon this most important question; and possibly the Council may desire to postpone the discussion upon it for a few weeks. But, in order to preserve our position under Standing Orders, we now bring up the following recommendation: (*a*) 'That the Council do apply to Parliament in the ensuing session for power to bring additional supplies of water to London from the watersheds of the Usk and Llangorse, upon the lines of the report of the Water Committee, as approved by the Council on April 21, 1896.' In connection with the subject of the future supply of water to the Metropolis, we cannot disregard the question of the purchase of the existing water undertakings. As the Council will remember, the Council's Bills of last year were lost by reason of the Government refusing to allow them to go to a Committee except upon certain conditions to which the representatives of the Council could not assent. The same considerations as those which have influenced us in making the foregoing recommendation induce us to think that the Council ought to decide now that, so far as it is concerned, it is ready to renew its proposals of purchase. The precise forms of the proposals will come before the Council when the Bills are prepared, and for the present we think it sufficient to recommend—(*b*) 'That a Bill or Bills be prepared for introduction in the session of 1897 for the purchase of the undertakings of the eight Metropolitan Water Companies.' If the Council agree to these recommendations, it would, in the ordinary course, refer them to the Parliamentary Committee. We think that the special circumstances of the case warrant us in asking that we be associated with the Parliamentary Committee in the preparation of these Bills, as has been done on previous occasions with respect to the Water Bills. We recommend—(*c*) 'That it be referred to the Parliamentary Committee, in conjunction with the Water Committee, to prepare and submit to the Council the necessary Bills for carrying out the foregoing resolutions.'"

In a report dated the 19th ult., the Committee stated that they had engaged the assistance of Sir Benjamin Baker, K.C.M.G., and Mr. G. F. Deacon, M.Inst.C.E., to advise them upon the whole scheme for the supply of water from Wales; the terms of reference being as follows:—

"1.—There will be placed before the gentlemen in question the report and evidence of the Royal Commission, notes of evidence and speeches in the case of the Staines Water Bill, session 1896, all the reports of the Chief Engineer relating to the Staines scheme and to the proposed Welsh supply, together with all the plans, sections, estimates, and rainfall observations which he has made since 1890, and also the various reports of the Water Committee.

"2.—Sir B. Baker and Mr. Deacon are requested to consider the detailed proposals, plans, and estimates contained in the report of the Chief Engineer, dated June 8, 1894, in connection with his scheme for obtaining water from the valleys of the Usk, Wye, and Towy, and their tributaries, and to advise as to their suitability and sufficiency or otherwise.

"3.—The above-named Engineers are requested to report on the question of the practicability and the cost of carrying out schemes of storage for providing 200 million, 300 million, and 400 million gallons per day respectively from the Thames on the lines of the suggestion in the report of the Royal Commission.

"4.—The above-named Engineers, taking into consideration the whole of the circumstances of the case, and having regard to the increasing rate of consumption per head, are requested to give their best advice to the Council as to whether or not it would be more advantageous to bring into London from the proposed Welsh sources than from the Thames the additional quantity of water, over and above the quantity at present supplied, which will be required for the supply of the population of 11¼ millions, as estimated by the Royal Commission,

"5.—The following further question is also proposed upon which, if the

Engineers think it expedient, the Committee will be glad to have a short preliminary report: The attention of the Engineers being directed to the report of June 8, 1894, they are requested to advise generally as to whether, in their opinion, there is any other source of supply for the Metropolis which presents such *à priori* advantages over either the scheme proposed by the Engineer of the London County Council or the suggested scheme of storage in the Thames Valley as would justify the selection of such other source in preference to both of the last-mentioned schemes."

The following amendment on recommendation (*a*) was placed on the *agenda* by Lieut.-Col. Ford: "That all words after the word 'session' be omitted, and that the following be added: 'for largely increased powers in connection with the water supply of London by the existing Water Companies, and (among others) power for the Council to furnish any additional capital which may be required by any of the existing Companies; and the Council also directs that every endeavour shall be made to induce Parliament to amend the law under which the Water Companies can increase their water-rates in proportion to the increased annual value of tenements, and also to transfer to the Council such of the powers of the Local Government Board in relation to the Water Companies as may from time to time be agreed between the Council and that Board.'"

On the question coming up for consideration, the Earl of Onslow moved, as an amendment to the above-mentioned recommendation, that the matter should be postponed until the report of Sir B. Baker and Mr. Deacon had been received. Mr. T. W. Williams seconded. Mr. W. H. Dickinson (the Chairman of the Committee) said he did not think this was a matter which ought to be postponed. The question of the water supply of London was becoming so pressing, that it was necessary that in the next session of Parliament some steps should be taken to get powers to procure more water from some source or other. After some further discussion, the matter was adjourned till the next meeting.

THE WEST RIDING COUNTY COUNCIL AND THE HUDDERSFIELD WATER BILL.

At the last Meeting of the West Riding County Council, the Chairman (Mr. C. G. Milnes-Gaskell), in moving the reception of the Law and Parliamentary Committee's report, said he regretted that the Council had not succeeded in securing the insertion of clauses which they desired to introduce into the Huddersfield Water Bill. At the instance of the Sanitary Committee, the Law and Parliamentary Committee had pressed upon the Local Government Board and the Committees of both Houses of Parliament the subject of lead-poisoning. Upon several occasions, conspicuous success had been attained by the Council, especially in regard to the Barnsley and Sheffield Water Bills, in each of which clauses had been inserted which fully satisfied the Committee. When the Huddersfield Water Bill came before Parliament, the Local Government Board issued a supplementary report, in which they emphasized the necessity of making precautionary provision against the recurrence of lead-poisoning at uncertain intervals in the West Riding, stating that the waters which were to be collected in the new Huddersfield reservoirs were such as should be classed among those liable to be affected by lead, and suggesting to the House of Lords' Committee that the same precautions should be insisted upon as in the cases of the Barnsley and Sheffield Bills. The Law and Parliamentary Committee considered that they could safely leave the matter to the Local Government Board, in view of this very strong report. But he found that the Lords' Committee had passed the Bill without the added provisions which were considered by the Board to be so necessary. It was very disappointing that the recommendations of the Board should be so disregarded, considering that the report had taken five years to prepare, and was the outcome of most careful consideration of a very serious question.

At the meeting of the Huddersfield Corporation last Wednesday, the Town Clerk presented a long statement upon the opposition of the West Riding County Council to the Huddersfield Water Bill. The County Council were accused of having taken to the Local Government Board correspondence from the Corporation marked "without prejudice," and endeavouring to induce them to oppose the Bill. Alderman J. Crosland (Chairman of the Water Committee), Alderman Hirst, and others criticized in strong terms the opposition of the County Council to the Bill right up to the House of Lords, and then withdrew after they had run the ratepayers of Huddersfield to an expense of upwards of £500.

WAKEFIELD CORPORATION WATER RESERVOIRS.

A Sub-Committee appointed by the Wakefield Corporation for the purpose of determining whether, and for what length of time, the construction of the Linsgreave, Oxygrains, and Booth Dean reservoirs could be postponed, with due regard to the general efficiency of the water-works and the security of a large water supply, have issued their report. It states that the supply at present afforded from the Ringstone reservoir and the catchwaters connected therewith amounts to 2,191,655 gallons per day; and the Green Withens reservoir will yield a net additional supply of 591,695 gallons per day—making a total available supply of 2,783,350 gallons. The existing supply of 2,191,655 gallons is shown to be sufficient for all purposes by the fact that there are no complaints of shortness of quantity, and that in the city the rate of supply per head is largely in excess of that in other towns of similar population and character. It follows, therefore, that for present purposes the Corporation will, when the Green Withens reservoir is finished and in operation, have in hand a surplus beyond their present requirements of 591,695 gallons per day; proving that, when the Green Withens reservoir is in operation, there will be for existing needs more than an ample provision for daily supply. The population now supplied with 15 gallons per head daily is estimated at 142,220; and with a normal increase in the population, it is calculated that the supply in 1905 will be above 267,000 gallons per day in excess of requirements. The three reservoirs when full will contain 785 million gallons, or sufficient to last 181 days. The Engineer (Mr. Rofe) is of opinion that 200 days' storage is a provision which it will be prudent for the Corporation to ensure; but in face of the fact that 181 days' storage covers the supply required ten years hence, the Sub-Committee consider that it is unnecessary to go to the very serious expense of providing new reservoirs merely to secure an additional 19 days' storage. Under these circumstances, the Committee think the construction of the intended new reservoirs may be safely deferred, at any rate, until the year 1905. But as the Committee's conclusions have necessarily been based upon estimates, they recommend that the question be again reviewed in the light of actual experience at the expiration of five years. As a protection against any excessive drought which might occur before the construction of the intended new reservoirs is undertaken, the Sub-Committee suggest the desirability of sinking a well into the sandstone rock which underlies the Corporation's property at Ardsley, from which about 250,000 gallons of water per day (which, although hard, is pure) could be obtained, but would only be required to aid the supply from Rishworth in any times of urgent necessity. The cost of these works would be about £5000. The Sub-Committee further point out that there is little, if any, risk of the Corporation losing any of their existing parliamentary powers, and recommend that application should be made to Parliament for the renewal of the powers (before the actual lapse) for a further period of ten years. The report was submitted at the meeting of the City Council last Tuesday, and was adopted.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

We are in the height of the season in which owners of gas undertakings shed their annual accounts; and there are so many of them this week, that I really scarcely know where to begin.

Taking Arbroath first, I find that Mr. Carlow was able to report that he had carbonized 5308 tons of coal during the year, as compared with 5043 tons in the preceding year; that the output of gas was 52,718,600 cubic feet, against 49,791,600 feet—an increase of 5·55 per cent.; that the yield of gas per ton was 9980 cubic feet—an increase of 58 cubic feet; and that the gas sold per ton was 8967 cubic feet—an increase of 11 cubic feet. The leakage amounted to 7·987 per cent.—a decrease of 1·298 per cent.; and the average illuminating power was 25·25 candles. The number of consumers was 4949; being an increase of 28. A more satisfactory tale in the manufacturing department could scarcely be told. Every item shows an improvement. The revenue amounted to £10,872; and of this £9917, or an increase of £393, was derived from gas. The total expenditure was £10,861, which left a net profit of £11. Half of this amount goes to the Town Council, and the other half to the benefit of the gas consumers. A sum of £300 was placed to the sinking fund, and £749 to suspense. The accounts were adopted at a meeting of the Gas Corporation on Thursday; and estimates were approved for the current year, which show an income of £10,414, and an expenditure of £10,344. In this year's estimates, a sum of £250 is provided for, to be applied in extinction of the arrears of interest on the harbour loan, which is a new impost. This improved position of the revenue account is attributed to the benefit to be derived from the working of the new sulphate plant; a sum of £900 being estimated from residuals. The account relating to the new chemical works showed a revenue of £1526. This was made up of £387 from sulphate of ammonia, £244 from naphtha, £456 from tar, and £438 in stock. The expenditure being £659, there was a net profit on the chemical works of £866, which was sufficient to justify the Corporation entering upon the new venture. The price of gas has been reduced from 4s. 2d. to 3s. 11½d. per 1000 cubic feet.

Mr. T. Douglas Hall, of Montrose, reported to his Company on Wednesday, that last year he carbonized 2712 tons of coal, from which there was a yield of 28,375,100 cubic feet of gas—an increase of more than 1 million cubic feet upon the output in the preceding year. The average illuminating power was 26 candles. The leakage was 12·21 per cent., or 0·39 per cent. more than in the preceding year. This increase Mr. Hall explained by the bad state of public lamp fittings, and the use of incandescent gas-lamps, of which there were twenty employed during most of last winter. These, with the bye-pass burners, consumed 4 cubic feet of gas per hour; while only 2½ cubic feet are paid for. The Chairman (Mr. A. Dickson) stated that the revenue amounted to £5931, and the expenditure to £4468; leaving a surplus of £1463. Out of this, the Directors proposed to pay a dividend at the rate of £2 12s. 6d. per share, absorbing £1312, and leaving £150 to be carried forward. The accounts were adopted. The Chairman said that last year the price of gas was reduced by 2d. per 1000 cubic feet, which entailed a reduction of about £200 of revenue. Meter-rents realized about £270 yearly; and it was proposed to abolish them, which would represent a reduction in the price of gas of about 3d. per 1000 cubic feet. This was agreed to. It was then proposed that the capital of the Company, which stood at £20,000, be reduced by one-eighth. The works, it was stated, are fully insured; and it would be better that the money should be distributed among the shareholders than that it should lie in bank at merely nominal interest. The shareholders, however, resolved to call a special meeting of the Company in October to consider the proposal, when a valuation of the works by an expert will be laid before them.

At a meeting of the Wishaw Police Commission on Monday, it was reported that the income in the gas department was £4262, and the expenditure £4472; but as the stock of coal had been reduced by nearly £86, there was a loss on the year's working of £296. Of an original loan of £13,500 for the gas undertaking, there had been repaid £5000; and of a second loan of £6000, there had been repaid £600. They have now entered into a new loan of £1500; and this leaves a total liability on the gas undertaking of £14,337.

The Kirkcaldy Gaslight Company held their annual meeting on Thursday. Mr. W. Gibb, the Chairman, submitted the report of the

Directors, from which it appeared that the gas made during last year amounted to 89,913,900 cubic feet—an increase of 6,735,300 cubic feet over the quantity in the previous year. There was a net profit of £4474, out of which £1200 was expended in payment of dividend, £300 was added to the reserve fund, and the balance was carried forward. The price of gas was reduced from 3s. 1½d. to 2s. 11d. per 1000 cubic feet. A local comment on the report says that: "This reduction in the price of gas will in a manner compensate for the higher rates of assessment it is proposed to levy." Which means that, while the local authority are imposing heavier burdens on the community, Mr. A. MacPherson, the Manager of the Gas Company, is lightening them.

The Peterhead Gas Commissioners had their annual accounts before them on Monday. I do not agree with Provost Smith when he said that the accounts for the year were fairly, if not very, satisfactory. I think the sequel will show that they could not have been much better. The Provost's speech, too, was about the clearest exposition of the kind I have ever read. He said that the gross revenue for the year was £4565, which was only £10 less than in the preceding twelve months, notwithstanding there had been a reduction of 3d. per 1000 cubic feet. The total expenditure was £2961, or about £4 less than last year, though a much larger quantity of gas had been manufactured and sold. The balance between these two figures, which was carried to the net revenue account, was £1603, as compared with £1610 the previous year. This, together with £1214 carried from the previous year, and £22 7s. 11d. of gas sold under-estimated, brought the revenue account up to £2840. From this money, they had paid £458 into sinking fund, and £562 in payment of mortgages, &c.; leaving £1819 to be carried forward. This was £600 more than last year, which amount represented approximately the profit realized on the year's working. Loans had increased by £1500—due to the payment for the new gasholder, the cost of which was £2000—of which £500 had been repaid. Last year they owed the bank £452; but this condition of things was altered, and the bank now owed them £352. In making up their estimates for the current year, they supposed that, if the price of gas were retained at 5s. 3d. per 1000 cubic feet, the revenue would be £4493, or about £70 less than in the past year; and the expenditure would be £2991, or £30 more. This would leave £1502 to be carried to the net revenue account, bringing it up to £3342. They had set aside £509 for sinking fund, and £562 for interest, which would leave a balance of £2271. This was £451 more than the balance they held this year, and was what they had to operate upon. They therefore proposed to reduce the price of gas by 3d. per 1000 cubic feet, which would absorb £200, and leave a balance of £251 to meet contingencies. Provost Smith spoke highly, and spoke rightly, of the skill, attention, and economy which was practised by the Manager (Mr. J. Kincaid). The recommendations of the Committee were adopted.

The accounts of the Alloa Corporation Gas Department for the past year showed a revenue of £7653, of which £6330 was derived from the sale of gas, £577 from tar and ammoniacal liquor, and £663 from coke and refuse lime. The expenditure amounted to £6810, of which £2601 was paid for coal, oil, and lime. There was a profit of £842, which, added to £1341 brought forward, made a total at the credit of profit and loss account of £2184. Out of this, £825 was added to sinking fund, raising it to £13,335, and £1343 was carried forward. Of the £34,385 borrowed, the Commissioners have repaid £13,135; leaving an indebtedness of £21,250. But, as stated above, they have a sinking fund of £13,335, and a reserve fund of £1000; so that in reality their capital liability only stands at £6915. The Commissioners met on Tuesday, when the accounts for the year were submitted by Bailie Arrol, who said that, with favourable contracts for the present year, and the consumption of gas being steadily on the increase, the Gas Committee proposed to reduce the price from 2s. 10d. to 2s. 6d. per 1000 cubic feet. The illuminating power is 28 candles. The reports were adopted. It appears that the price of gas has been reduced within the past ten years from 3s. 9d. to 2s. 6d. per 1000 cubic feet, which represents a saving of £3000 to the gas consumers. The Commissioners have every reason to be gratified with the working of the Peebles oil-gas process. The Manager (Mr. A. Yuill) is, however, to be President of the North British Association of Gas Managers on Wednesday next; and as he will probably have something to say on this subject, I may leave it where it is just now.

At a meeting of the Johnstone Town Council on Monday, it was reported that the income from gas sold during the past year amounted to £5010—an increase of about £600 upon the sum realized the preceding twelve months. Secondary products yielded £386. The net profit on the year's working was £431. Of a total sum borrowed of £22,000, there has been repaid £8800; but it is estimated that the gas-works and plant represent a value of about £35,000.

The Irvine Gaslight Company had last year a revenue of £3412, which was an increase of £340. The balance of profit was £634. A dividend at the rate of 10 per cent. was paid; the price of gas was retained at 3s. 9d. per 1000 cubic feet; and the Manager (Mr. A. Walker) was voted fifteen guineas for extra work in connection with alterations at the works.

The Blantyre Gas Company have reduced the price of gas from 4s. 2d. to 3s. 9d. per 1000 cubic feet.

The Dumfries Gas Commissioners held their annual meeting on Monday. Mr. Currie, who presented the accounts for the year, stated that the new purifiers had been completed in a very satisfactory way; and the cost had been £3458, while the Manager's estimate was £4000. The Corporation took over the gas undertaking in 1878; and their total capital expenditure had been £41,866. Of this sum they had repaid £15,114, which, deducted from the mortgage debt of £40,000, left £24,885 still due. If they calculated depreciation at 1½ per cent. per annum since 1878, the value of the works at May 15 last would have been £34,198. Taking the capital outlay at £41,866, the following sums were paid out of profit and loss account, which, if the works were in the hands of a private company, would have gone to the shareholders as dividend: Interest on temporary loans, £73; interest on mortgages, £999; instalment for redemption of mortgages, £1300; and reserve fund, £250—total, £2623. This sum, if applied as dividend on £41,866, would yield a percentage of £6 5s. 3d. If the value of the works were taken after allowance for depreciation, the percentage would be £7 13s. 5d.; and if on the balance of £24,885 of mortgages remaining, it would be £10 10s. 9d. If, instead of calculating depreciation at 1½ per cent., they struck off the larger sum of £11,866, they would still have a value of works amounting to £30,000, as against £24,885 of mortgages existing. In Dumfries, the rate of capital expenditure per million cubic feet of gas manufactured was £609. They proposed to retain the price of gas at 3s. 4d. per 1000 cubic feet, and estimated that they would have a balance at the end of the year of £94. The accounts were approved.

The Broughty Ferry Police Commissioners held their annual meeting on Monday night. Before proceeding with the customary business, the Commissioners received a deputation of ratepayers to protest against the proposed increase of £50 a year, raising his salary to £200, to Mr. A. Waddell, the Manager. In reply to the deputation, Mr. Machan, the Convener of the Gas Committee, pointed out that Mr. Waddell had, by undertaking the reconstruction of the gas-works without outside help, saved the community over £3000. It was also pointed out, which I think is sufficient to dispose of the frequent complaint that while the price of gas has been lowered, the gas bills of consumers have not diminished, that whereas in 1892-93 the quantity of gas made was 25½ million cubic feet, the revenue from which was £5254, last year the amount of gas made was 35½ million cubic feet, the revenue from which was £5082. I need not go into the subject further than to say that the Commissioners, by seven votes to three, granted Mr. Waddell the increase to his salary; and that since then the Dundee newspapers have been boiling over with letters from indignant residents, who are furious at the action of the Commissioners—I am afraid too furious to be actuated by purely public considerations. As to the accounts, which Mr. Machan presented, they are remarkably satisfactory, and should rather lead to the community being proud of Mr. Waddell, than to their endeavouring to depreciate his work. The Commissioners estimated to sell 31,697,000 cubic feet of gas; whereas the amount sold was 34,410,650 cubic feet. The revenue from gas and secondary products was £6569, or an increase of £494 over the estimate; residual products having realized £1271, or £171 more than the estimate. The surplus was estimated at £127; but it had amounted to £444. They proposed to allow the Police Commissioners an abatement in the charge for gas consumed in the public lamps to the amount of £265, or equal to 1d. per pound on the rates, and to reduce the price of gas from 3s. 4d. to 2s. 11d. per 1000 cubic feet. The Commissioners estimated to sell 36 million cubic feet of gas, and to have a surplus of £72. The recommendations of the Gas Committee were adopted. This is the third year in succession in which the Commissioners have reduced the price of gas by 5d. per 1000 cubic feet; and Mr. Machan expects that the estimates which have been adopted will be exceeded, and that there will be a still further reduction in the price.

The Falkirk Gas Commissioners had this week a long conversation over an arrangement about the collection of gas accounts; the proposal being to place the collector in the office at the gas-works, instead of in the burgh buildings, so that he would be at hand to look after matters in the works when the Manager (Mr. P. B. Watson) is absent. The suggestion was agreed to; but it is of little interest, except that, in the course of the discussion, it was stated that the accounts for the year have not yet been audited, but that the surplus—said to be about £50—is much smaller than was anticipated. This was stated to be owing to the public burdens—rates, taxes, interest, &c.—not having been properly calculated when drawing up the estimates. There was a complaint that the Commissioners had been too fast in their capital expenditure, which was quite to be expected, as large sums have been, and are being, spent; but the expenditure has been judicious, and the assurance was given that it had already been productive of saving to the undertaking. That is what I would expect. It was inevitable that the Commissioners should face large outlays, as this was what the Company proposed to do.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *July* 18.

Sulphate of Ammonia.—The market tends rather to droop. Production in the Hull and Liverpool districts is now at its minimum; and prices in these markets have been fairly well maintained. In Scotland, however, where the output is not similarly reduced in summer, the market is weak; and lower prices have had to be accepted. The quotations are £7 15s. Leith, £7 18s. 9d. Hull, and £8 2s. 6d. Liverpool. Consumers for the most part hold aloof, notwithstanding the inducement of low prices; the buying being mainly for covering purposes. In the forward position, speculators continue to offer up to the end of the year at a very slight premium upon spot prices; and some business is being done. Scotch makers are still offering at £8 10s., October-June delivery; but this price does not induce business—buyers apparently preferring to wait events.

Nitrate of Soda is firm at 8s. per cwt. on spot for fine quality. In the forward position, the market is rather quieter; but 7s. 11¼d. per cwt. is required for cargoes of ordinary quality.

LONDON, *July* 18.

Tar Products.—A steadier market is reported for pitch. Makers have been quite easy during the efforts of middlemen and other buyers to reduce the price of pitch. Fortunately, there are no stocks of pitch anywhere, either in the hands of producers or buyers; and, as the make will certainly not be increased owing to the rapid development of the water oil-gas processes, there is no reason why distillers should take a lower price. Naphthalene continues in good request; and it is hoped that the new-found outlet for this troublesome product will be maintained. Benzols are firm. Prices, however, have apparently touched a top figure. Solvent naphtha is somewhat scarce, with a tendency to harden in price. A fair inquiry for carbolic acid in its various forms exists; but the tendency is rather to lower prices.

Transactions during the week have been noted at the following prices: Tar, 19s. to 25s. 6d. Pitch, 32s. Benzols, 90's, 2s. 11d. to 3s. 1d; 50's, 2s. 4½d. to 2s. 6d. Toluol, 2s. 2d. Solvent naphtha, 1s. 4d. Crude, 30 per cent., naphtha, 10½d. Creosote, liquid, 2¼d.;

ordinary, 1½d. Naphthalene, pressed, £3; salts, 32s. 6d. Cresylic acid, 11d. Carbolic acid, 60's, 2s. 1d. Anthracene, "A," 10½d.; "B," 8½d.

Sulphate of Ammonia.—This market is in a lifeless condition, apparently without any power of recuperation. Buyers continue indifferent; and any business is more or less forced at £7 15s. Northern ports, to £8. Southern and Western ports, in all cases less 3½ per cent. discount, f.o.b., bags inclusive. Gas liquor is nominally quoted 6s. to 7s.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—During the past week there has been somewhat of a rush of buying, owing to needless fears on the part of consumers that the break-up of the Conciliation Board may be followed by another general wages conflict. Pits in many cases have been able to go back on to full time, and generally have been working four to five days per week; while prices have been stronger all through. All this anxiety is, however, practically groundless. So far as the coal-owners are concerned, it may be stated on what is practically official authority, that they have no present intention of making another general move for a reduction in wages. If any action is taken, it will be independent movements on the part of individual collieries; and the only danger of any general stoppage would be in the Miners' Federation, in the event of isolated attempts here and there to enforce reductions in wages, calling out the whole of their members. As, however, such a course of action would inevitably drive the coal-owners into another strong combination, which is the last thing the Miners' Federation desire, it is scarcely probable they would deliberately defeat their own policy of weakening the position of the coalowners as much as possible. Here and there in different districts there may be stoppages over wages questions, which locally will no doubt have some disturbing effect upon trade; but that there will be any general stoppage, there need be no serious apprehension. With regard to the Manchester gas coal contract, to which reference was made last week, the Corporation have since supplied a sort of semi-official statement containing a few further particulars. It seems that they have bought nearly 400,000 tons; and that the quantity offered was upwards of 3,500,000 tons—figures slightly in excess of those given last year. It is admitted that the prices were all under those of last year; but South Yorkshire has secured only a very small proportion of the contracts this season—the bulk having gone into the hands of Lancashire coalowners. At the pit mouth, 10s. per ton is the rate for best Wigan Arley; and 8s. 6d. to 9s., for Pemberton four-feet and seconds Arley.

Northern Coal Trade.—There has been an increased demand for coal generally during the last few days, both for export and in some branches of the home trade. In the former, there is a readiness to take advantage of the current low rates of freight; and there seems also to be more disposition to stock coal in anticipation of stoppage of production in the Midlands. Gas coals are a little steadier. The large local contracts noticed last week are now formally concluded at 6s. 6d. per ton at the works, for eighteen months—the delivery commencing with next year. For odd cargoes of gas coal, the price that has just been named is substantially the current quotation; and it is probable that there will not be very much variation, unless strikes in other districts should make the demand very keen for Durham gas coals. In gas coke, there is very little movement. There is a slight increase in the output; but it seems to be fairly taken up, and fuller exports are anticipated. The price is practically unchanged; and no contracts of moment have of late been arranged.

Scotch Coal Trade.—There is still an improvement in the amount of orders, but not, as yet, in prices. The belief is gaining ground that there will be no strike in England; and consequently, though buyers are anxious to plant orders, they are not frightened so much as to raise the tone of the market. The prices quoted therefore remain the same—viz.: Main, 5s. 9d. per ton f.o.b. Glasgow; ell, 6s. 3d. to 6s. 9d.; and splint, 6s. 3d. to 6s. 6d. The shipments for the week amounted to 167,947 tons—an increase of 1732 tons when compared with the preceding week, and of 6673 tons when compared with the corresponding week of last year. For the year to date, the total shipments have amounted to 3,831,485 tons—an increase over the same period of last year of 205,754 tons.

Issue of Additional Debenture Stock by the Southampton Gas Company.—An instance of the high appreciation in which the debenture stock of the Southampton Gas Company is held was afforded last Wednesday, when the Directors considered tenders submitted for £5000 of 5 per cent. stock. The amount applied for was £33,887; and the £5000 was allotted at £160 10s. per cent.—being a premium of £3025.

Experimental Street Lighting in the City.—The Streets Committee of the Commissioners of Sewers of the City of London have recently embarked upon a series of experiments in electric and incandescent gas lighting in some of the minor streets, with the view of determining the best system of illumination to be generally employed in the future. In Wood Street, incandescent gas-lamps have been erected; and in Watling Street, Old Change, Friday Street, Bread Street, and Bow Lane, arc and incandescent electric lights have been used. For the sake of comparison, some of these have been fixed on brackets, while in other instances the lamps have been suspended above the centre of the roadway, far removed from any possibility of contact by vehicular traffic. The Streets Committee of the Commission will shortly present a report recommending which they consider to be the best kind of illuminant.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST (see ante, p. 116).

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
590,000	10	15 Apl.	10½	Alliance & Dublin 10 p. c.	25—26	..	4 0 9
100,000	10	"	7½	Do. 7 p. c.	17—18	..	4 3 4
300,000	100	1 July	5	Australian (Sydney) 5 % Deb.	108—110	..	4 10 11
200,000	10	12 June	5	Belgrano (B. Ayres), Limited	10—11	..	4 10 11
100,000	Stck.	26 June	5	Do. 5 p. c. Deb. Stk	100—103	..	4 17 1
200,000	5	29 May	6½	Bombay, Limited	7¼—7¾	..	4 3 10
40,000	5	"	6½	Do. New, £4 paid	5½—6	..	4 6 8
380,000	Stck.	27 Feb.	12	Brentford Consolidated	290—295	..	4 1 4
210,000	"	"	9	Do. New	220—225	..	4 0 0
50,000	"	"	5	Do. 5 p. c. Pref.	—	..	—
159,375	"	12 June	4	Do. 4 p. c. Deb. Stock.	130—134	..	2 19 9
220,000	Stck.	27 Mar.	11	Brighton & Hove Original	237—242	..	4 10 11
208,820	"	"	8	Do. A Ord. Stk.	190—195	..	4 2 0
933,500	Stck.	27 Feb.	5	Bristol, 5 p.c. max.	127—132	..	3 15 9
420,000	20	27 Mar.	11½	British	57—58	..	3 17 7
50,000	10	12 Mar.	11½	Bromley, Ordinary 10 p. c.	22½—23½	..	4 17 11
71,000	10	"	8½	Do. 7 p. c.	19—20	..	4 5 0
500,000	10	29 Apl.	5	Buenos Ayres (New) Limited	10—11	..	4 10 11
200,000	100	1 July	6	Do. 6 p. c. Deb.	100—105	..	5 14 3
150,000	20	15 July	8½	Cagliari, Limited	29—31*	+½	5 6 5
100,000	10	29 May	8	Cape Town & District, Ltd.	17—18	..	4 8 11
50,000	50	2 May	6	Do. 6 p. c. 1st Mort.	58—60	..	5 0 0
550,000	Stck.	15 Apl.	13½	Commercial Old Stock	342—347	..	3 17 8
165,000	"	"	10½	Do. New do.	258—263	..	2 19 10
165,000	"	12 June	4½	Do. 4½ p. c. Deb. do.	149—152	+2½	2 19 2
800,000	Stck	12 June	13	Continental Union, Limited.	285—290	..	4 9 8
200,000	"	"	10	Do. 7 p. c. Pref.	220—225	..	4 8 11
51,600	Stck.	27 Feb.	14	Croydon Com'cial A 10 p. c.	—	..	—
157,500	"	"	11	Do. B 7 p. c.	—	..	—
535,000	Stck.	27 Feb.	5½	Crystal Palace Ord. 5 p.c. Stk	135—140	..	3 15 0
60,000	"	"	5	Do. 5 p. c. Pref.	—	..	—
486,090	10	15 July	11	European, Limited	26½—27½*	..	4 0 0
354,060	10	"	11	Do. £7 10s. paid	17½—18½*	..	4 9 3
5,746,590	Stck.	13 Feb.	12½	Gaslight & Coke, A, Ordinary	315—320	+1	3 19 8
100,000	"	"	4	Do. B, 4 p. c. max.	103—113	..	3 10 9
665,000	"	"	10	Do. C, D, & E, 10 p. c. Pf.	297—302	..	3 6 3
30,000	"	"	5	Do. F, 5 p. c. Prf.	145—150	..	3 6 8
60,000	"	"	7½	Do. G, 7½ p. c. do.	210—215	..	3 9 9
1,300,000	"	"	7	Do. H, 7 p. c. max.	208—213	..	3 5 9
463,000	"	"	10	Do. J, 10 p. c. Prf.	295—300	..	3 6 8
476,000	"	"	6	Do. K, 6 p. c. Prf.	172—177	..	3 7 10
1,061,150	"	12 June	4	Do. 4 p. c. Deb. Stk.	138—143	..	2 15 11
294,850	"	"	4½	Do. 4½ p. c. do.	148—153	..	2 18 9
908,000	"	"	6	Do. 6 p. c. do.	207—212	+2½	2 16 7
70,000	10	14 May	6	Hongkong & China, Limited	12½—13½	..	4 8 10
3,800,000	Stck.	14 May	12	Imperial Continental	253—258	..	4 13 0
376,400	100	1 Feb.	4	Do. 4 p. c. Debs. Red.	100—103	..	3 17 8
473,600	Stck.	13 Feb.	3½	Do. 3½ p. c. Deb. Stk	109—111	..	3 3 1

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d
75,000	5	26 June	6	Malta & Mediterranean, Ltd.	6—6½	..	4 12 4
560,000	100	1 Apl.	5	Met. of Melbourne, 5 p. c. Deb.	115—118	..	4 4 10
250,000	100	"	4½	Do. 4½ p. c. Debs.	110—112	..	4 0
541,920	20	12 June	5	Monte Video, Limited	16½—17½	..	5 14 3
150,000	5	29 May	8	Oriental, Limited	8½—8¾	..	4 11 5
135,000	5	"	8	Do. New, £4 10s. paid	7¼—7½	..	4 12 10
15,000	5	"	8	Do. do. 1879, £1 paid	1—2	..	4 0 0
60,000	5	12 Mar.	7	Ottoman, Limited	5—5½	..	6 7 3
166,870	10	—	2	Para, Limited	1½—1¾	..	—
420,000	100	1 May	6	People's Gas } 1st Mtg. Bds.	105—110	..	5 9 1
500,000	100	1 June	6	of Chicago } 2nd Do.	102—107	..	5 12 1
250,000	10	27 Mar.	8	San Paulo, Limited	13—14	..	5 14 3
500,000	Stck.	13 Feb.	15½	South Metropolitan, A Stock	410—420	..	3 13 9
1,350,000	"	"	12	Do. B do.	317—322	..	3 14 6
310,000	"	"	13	Do. C do.	338—343	..	3 15 9
820,000	"	15 July	5	Do. 5 p. c. Deb. Stk.	173—176*	+½	2 16 10
60,000	Stck.	12 Mar.	11½	Tottenham & Edmonton, A	250—255	..	4 10 2
60,000	"	"	8½	Do. B	—	..	—
170,380	10	29 May	10	Tuscan, Limited.	13½—14½	..	6 18 0
149,900	10	1 July	5	Do. 5 p. c. Debs. Red.	98—100	..	5 0 0

WATER COMPANIES.

746,123	Stck.	26 June	10½	Chelsea, Ordinary	345—350	..	2 18 7
150,000	"	"	5	Do. 5 p. c. Pref.	170—175	..	2 17 1
160,000	"	"	4½	Do. 4½ p. c. Pref. Stk., 1875	—	..	—
175,785	"	27 Mar.	4½	Do. 4½ p. c. Deb. Stock	158—163	..	2 15 2
1,719,514	Stck.	15 Apl.	7	East London, Ordinary	238—243	−2	2 17 8
654,740	"	26 June	4½	Do. 4½ p. c. Deb. Stk.	156—159	..	2 16 7
100,000	"	"	3	Do. 3 p. c. Deb. Stk.	101—106	..	2 16 7
700,000	50	12 June	7½	Grand Junction, 10 p.c. max.	123—127	..	2 19 0
280,000	Stck.	27 Mar.	4	Do. 4 p. c. Deb. Stk.	149—153	..	2 12 4
708,000	Stck.	13 Feb.	12	Kent	352—357	..	3 7 3
160,000	"	"	7	Do. New, 7 p. c. max.	222—227	+4	3 1 8
1,043,800	100	26 June	7½	Lambeth, 10 p. c. max.	272—277	+2	2 13 11
406,200	100	"	7½	Do. 7½ p. c. max.	227—230	..	3 5 2
350,000	Stck.	27 Mar.	4	Do. 4 p. c. Deb. Stk.	147—152	..	2 12 8
500,000	100	13 Feb.	12½	New River, New Shares	439—444	..	2 17 6
1,000,000	Stck.	30 Jan.	4	Do. 4 p. c. Deb. Stk.	157—160	..	2 10 0
902,300	Stck.	12 June	4	S'thwk & V'xhall, Ordinary	158—163	−2	2 9 1
126,500	100	"	4	Do. Do. 7½ p. c. Max.	153—163	..	2 9 1
489,200	Stck.	"	5	Do. Do. 5 p. c. Pref.	167—172	..	2 18 1
1,019,585	"	15 Apl.	4	Do. 4 p. c. A Deb. Stk.	147—152	..	2 12 8
1,155,066	Stck.	12 June	10	West Middlesex	327—332	..	3 0 2
200,000	"	"	4½	Do. 4½ p. c. Deb. Stk.	157—162	+2	2 15 6

*Ex div.

Warwick Water-Works Extensions.—The Local Government Board having informed the Warwick Town Council that they are prepared to sanction a loan for the extension of the adit at the Haseley water pumping-station, the latter body has accepted a tender from Mr. Bell, of Tottenham—amounting to £1596—for the works.

The Dublin Corporation Bill Threatened.—A quickly convened meeting of the Committee of the whole Municipal Council of Dublin was held last Thursday to consider the course to be taken in reference to the "further instruction" to the Parliamentary Committee upon the Corporation Bill. The proceedings, as usual, were private, but it is stated that a debate took place upon a communication from the Lord Mayor that the Parliamentary Agents of the Corporation believed that the Bill could not possibly pass if the provisions set out in the "instruction" were sought to be embodied in the measure. In the view of the Agents, the new provisions would amount virtually to a new Bill. The statement was made that Mr. T. M. Healy had intimated that, unless all the new clauses were accepted, he would oppose the future stages of the Bill; and, if successful in this, there would be a money loss to the Corporation of more than £6000 a year, which, under the water supply clauses, the townships would have to pay into the city coffers. In the result, it is reported that the Committee expressed their opinion that "no matter should be introduced into the Corporation Bill other than that passed by the House of Lords Committee."

The Finances of the Dukinfield Gas Undertaking.—At the last monthly meeting of the Dukinfield District Council, the Finance Committee reported that application had been made to them by the Gas Committee for the provision of £1800, the amount of the deficiency standing on the profit and loss account for the year ending March 31 last. This sum was made up of £995 for the year 1894-5, and £805 for 1895-6. The Committee declined to grant the application, on the ground that the rate had been made for the current year. Mr. Gordon, in moving the confirmation of the minutes, referred to the resolution refusing to accede to the Gas Committee's request. He said the Finance Committee passed it because they were not prepared to disturb the estimate; yet there were on the Gas Committee members who strongly opposed such a resolution, because it was subsidizing the gas undertaking out of the rates. It became a very serious question, for first of all the Committee had thrown upon their hands the duty to provide the money in some form; and it affected to some extent the ratepayers when the question of adjusting and liquidating the sum had to be considered. It was not for him to make any suggestion as to what the Gas Committee were likely to do in the matter, but it would be their bounden duty to set to work and devise a scheme whereby some provision could be made not only for the £1800, but for obviating the increase of the loss in the future. They had it from the Gas Manager (Mr. Harrison Veevers), that if this thing went on as it was doing at present, the deficiency would be something like £350 to £400 per year. This was a very serious matter. It was now the duty of the Gas Committee to find some way out of the difficulty, because, if the resolution was confirmed by the Council, the Finance Committee would decline to grant the application. Mr. Stafford seconded the motion, and it was carried.

The Public Lighting of Southampton and District.—The question of the public lighting has been under the consideration of the Works Committee of the Southampton Town Council and of the Directors of the Gas Company, with the view of establishing uniformity in the system in the whole borough. At the last meeting of the Council, a letter was read from the Secretary of the Company (Mr. C. Crowther Smith), in which were set forth certain proposals, which the Works Committee recommended should be adopted. In the first place, the Directors, it was stated, were prepared to agree to the adoption of the average meter system in the Shirley and Freemantle districts on the same terms and conditions as prevail throughout the town and Portswood districts. The Company were willing to undertake the lighting, extinguishing, and cleaning of the public lamps in the Portswood district. With regard to the question of repairing, and of the cost of lighting, extinguishing, and cleaning the public lamps throughout the whole of the borough, the Directors suggested that the Company should charge the Council the cost price of such repairs as might be ordered from time to time by the Borough Engineer, and the actual amounts paid to the lamplighters for the performance of their duties. In order to establish uniformity in the system of public lighting, the Directors expressed their willingness to make the charge for gas supplied to the public lamps in the Shirley and Freemantle districts the same as in other parts of the borough. The recommendation was agreed to.

Holyhead and North Wales Gas and Water Corporation, Limited.—The statutory meeting of shareholders was held at the Queen Hotel, Chester, on Thursday, the 9th inst., under the presidency of the Chairman of the Company (Mr. Richard Thomas, J.P., the Mayor of Carnarvon). There was a full attendance of Directors and a large number of shareholders present. The Secretary (Mr. W. H. Sinclair) having read the notice convening the meeting, the Chairman stated that it was held in compliance with the provision of the Companies Acts, under which the Corporation was registered, and the business to be transacted was purely formal. There were no accounts to present, and no resolutions to move. He was, however, pleased to meet the shareholders to let them know what was being done in their interest. The transfer to the Company of some of the works had been completed; and in the case of others the transfer was pending, in consequence of the necessity of obtaining the consent of the Board of Trade, in respect of which the necessary steps had been taken. The Corporation were in actual possession of all the works; and matters were progressing very favourably. The Directors had decided on a progressive policy, bringing to bear upon their manufacture the most scientific methods; and, by adopting the various modern means of gas distribution in the shape of cookers, automatic meters, &c., they looked forward to a very largely enhanced revenue. The Chairman also pointed out the importance of the fact that the price of gas had been considerably reduced at all centres—a step which he felt assured must be followed by a largely increased consumption. He then called upon the General Manager (Mr. G. E. Saville) to read his report, which proved highly satisfactory, and was at once adopted. A vote of thanks to the Chairman was proposed by Mr. O. Isgoed Jones, of Llanrwst, and seconded by Mr. Alfred Tyrer, of Liverpool.

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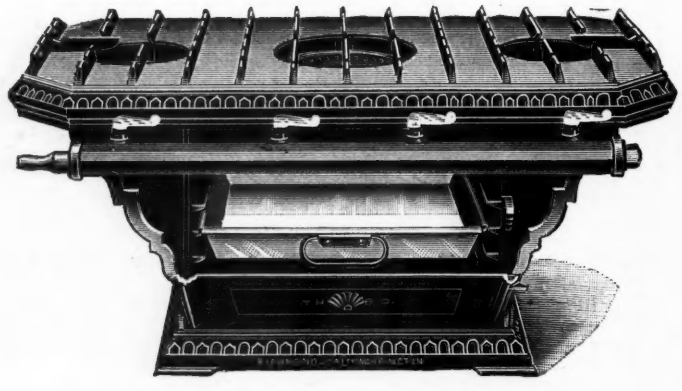

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Improvements at the Oldham Gas-Works.—Mr. John Chadwick, the Engineer of the Oldham Corporation Gas-Works, has made certain important proposals to his Committee as to additional storage and the improvement of the producing plant. At the Hollinwood works, there are four holders, in two lifts of 30 feet each, and 100 feet diameter. He suggests that each holder should have a third lift added, thereby increasing the storage capacity of each by 200,000 cubic feet; or, as an alternative, he points out that the Committee have land at Bower Clough on which they might erect a new holder capable of containing 2 million cubic feet. The Committee have referred the first proposal to the Town Clerk and Mr. Chadwick for further consideration. In regard to the Higginshaw works, Mr. Chadwick suggests the reconstruction of 20 sets of retorts in No. 1 house; his proposal being to pull down the present retorts, which are laid in beds of three, and construct new settings, with six retorts in a bed, similar to those already erected at the north end of the house.

The Eastbourne Water Company and their Charges.—At a meeting of the Eastbourne Town Council on Monday, the 6th inst., the Town Clerk reported that, after the withdrawal of the Council's opposition to the Eastbourne Water Company's Bill, he had to report to the Sanitary Committee that certain amendments had been introduced in Committee, providing *inter alia* that the Company should be entitled to levy their charges on the basis of the gross estimated rental of property as appearing in the rate-book, and authorizing them to refuse to supply water for a bath containing more than 50 gallons as usually filled, excepting at a higher rate. The Sanitary Committee then authorized the Town Clerk to present a petition to the House of Lords against the amendment, unless the Company agreed to withdraw the same, or unless, with regard to the latter amendment, the Parliamentary Agents advised that it was usual to make such provision. The Sanitary Committee also gave instructions for the Town Clerk to take Counsel's opinion, if necessary, as to the present power of the Company to charge on the gross estimated rental. At the meeting of the Sanitary Committee on the 22nd ult., it was stated that the opinion of Mr. Shiress Will, Q.C., had been taken, and that he advised that the Company had only power to charge on the rateable value. Acting on this opinion, the Town Clerk communicated with the Parliamentary Agents, and it was then found that the Company would not agree to a revision of their amendment so as to make it conform with the views of Counsel. But, after an interview with Lord Morley, the amendment was, with the concurrence of the Company's representatives, struck out altogether; so that their powers and rights on this matter remained as hitherto. The provision as to the bath being usual, the Town Council did not raise any objection to this amendment. The Secretary of the Company wrote that the fact was that the amendments were inserted by the Chairman of the House of Lords against the express wish of the Company, and quite contrary to their decision and intention; and the Town Clerk explained that they were really made at the suggestion of the Local Government Board. The subject, which had caused considerable comment in the town (it being thought that the Company had been guilty of bad faith), was left for other business.

Supplementary Water Supply for Leamington.—The Leamington Corporation have decided, as an auxiliary water supply is now required, to re-construct the well at Lillington, the execution of which was deferred owing to the collapse of the boring in the autumn of 1895, as reported in the "JOURNAL" at the time. Mr. Vicars, who was the then contractor, has secured the work.

The Gas Coal Contracts of the Leeds Corporation.—The Gas Committee of the Leeds Corporation last Thursday devoted some time to the consideration of the tenders for the supply of coal to the various gas-works in the city for the next twelve months. Last July contracts were accepted for 350,000 tons. But this year only 200,000 tons—of which 40,000 tons is to be cannel coal—is being ordered; the reason for this being that there are still deliveries to be made under the old contracts, and there is a good stock at the different works. The prices at which the contracts were entered into on Thursday varied a good deal, according to the quality, and the results which the different sorts will yield; but it is said that, when a careful comparison is made, it will probably be found that the rates are about the same as those at which the past year's supplies were purchased. Most of the contracts have gone to Yorkshire collieries.

The Chester Corporation and the Water Company's Supply.—The Sluices Committee of the Chester Corporation have submitted a report to the Council in view of the decision of the House of Commons Committee upon the portion of the Corporation Bill relating to the pollution of the River Dee. They say: (1) "The investigation resulted in a consensus of opinion (*a*) that, in the River Dee, Chester has a source of water supply than which no better could be desired; (*b*) that such source is subject to serious contamination both from above and below the Water Company's intake; (*c*) that if the sewage and sewage effluent from Chester now entering the river below the causeway were wholly stopped, it would not cure the tidal contamination of the supply; (*d*) that the filtration by the Water Company of the river water is excellent, and largely accounts for the pronounced good quality of the water as delivered to consumers, as contrasted with the contaminated river water. (2) The Corporation scheme for protecting the river from pollution having been rejected, the question arises: 'Is that protection obtainable by other means, or must another source of supply be sought for?' (3) Prevention of pollution of the river above the causeway can and ought to be effected; and the first step to be taken will be to make application for the constitution of a Joint Committee exercising the powers of the Rivers Pollution Prevention Act, 1876. (4) The Committee advise that the Corporation should concurrently take the necessary measures (*a*) to intercept from the tidal part of the river, and deal with, the sewage from the south side of the city; (*b*) to secure the best possible effluent entering the tidal part of the river from the sewage works. (5) It will still remain for consideration whether the necessary protection against tidal pollution can be best obtained by the removal of the Water Company's intake above tidal influence, or how otherwise. In view of the serious nature of the position, and to admit of its being maturely considered, the Committee defer making any recommendation to the Council until the August meeting."

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404	30	18	17	19	13½	11	18 ,, 17	2	50/-	2/6
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Lighting by Acetylene Gas.—An installation of acetylene gas lighting has been effected on the premises and grounds of the Union Tavern, Vassall Road, Camberwell; and at a garden party last Saturday, when about 500 persons were present, the large lawn was most effectively illuminated.

The Water Supply of Madeira.—Some months ago, attention was called, in letters to "The Times," to the very defective character of the water supply of Madeira; and reference was made to the matter in our columns. It was then stated that there were no engineering difficulties in the way; and the deplorable condition of Funchal was attributed solely to the apathy of the municipal authorities. These have now been aroused to the importance of the subject, if Madeira is to retain its position as a health resort; and they are taking the necessary steps to provide works for the supply of wholesome water to the town and district.

Incandescent Gas Lighting at Rotherhithe.—At a meeting of the Rotherhithe Vestry last Thursday, the Surveyor presented a report relative to experiments which have been in progress in Union Road in respect of the utility of incandescent gas-burners for street lighting. Six lamps were tried for 47 nights, and five lamps for 196 nights; and the result showed that while the cost of gas for the incandescent lamps was slightly more than for ordinary street-lamps, the illuminating power was 70 per cent. greater. It was agreed to continue the experiments for a short time; and then the whole question of lighting will be gone into.

The Explosion in the New Water Aqueduct of the Birmingham Corporation.—The inquiry into the circumstances surrounding the death of H. J. Farley, who died from injuries received through the explosion in the Bleddfa Tunnel, on the new water aqueduct of the Birmingham Corporation, was held last Wednesday. The shaft leading to the tunnel where the explosion occurred was 60 feet deep; and the heading was about half a mile from the bottom. On the day of the accident, 25 holes were drilled for blasting purposes, and fired in fours. The first four charges were all successful; but in the case of the second four, one did not do its duty, as a stone had in some way got into the hole. After searching with a wooden rammer the men tried to break the stone with a hand-drill, and the explosion instantly occurred. Farley was in front of the hole and was fearfully injured. One of the men in his evidence said he had no idea the charge had not exploded. In case of a misfire they should have waited for an hour, but this was not a misfire. He distinctly heard four explosions the second time. The jury returned a verdict of "Accidental death," and they considered no one was to blame for the sad occurrence.

The New Water Supply for Carlisle.—It was mentioned in the "JOURNAL" a few weeks since that Mr. C. B. Newton, the Corporation Gas and Water Engineer of Carlisle, was investigating the question of a supplementary water supply for the city. His survey so far has been most satisfactory; and he proposes that the new source shall be the higher reaches of the River Gelt. The gaugings taken during a dry season have proved that in this watershed there is available a quantity of water which would at once double Carlisle's present consumption of a million gallons per day. Two reservoirs would be required—one near the source, for storage purposes and filtration; the other, a service reservoir nearer the city. The elevations of the two reservoirs are such that there would be no difficulty in delivering the water at the highest part of the district at a pressure of 100 feet above the roadway. Arrangements will in due course have to be made with the Earl of Carlisle as soon as the Corporation are able to lay a definite scheme before his Lordship; and an Act of Parliament will be required, if the Town Council should further adopt the scheme. It is not possible at present to state very definitely the probable cost of the scheme; but it may be stated generally that it is believed it will not exceed £130,000.

The Quality of the Cardiff Water Supply.—There has been much complaint at Cardiff of late as to the water supply smelling offensively; but no reason can be assigned for this at head-quarters. At a meeting of the Corporation Water Committee on the 3rd inst., a letter (dated June 29) was read from Mr. Samuel Ward, the Manager of the Bute Gas-Works, East Moors, asserting that the water drawn from the taps at those works on that day was not fit for drinking purposes. It was considered by several members that a full investigation and an analysis should be made of the water, so as to satisfy the public mind. The Water Engineer (Mr. C. H. Priestley) thought that whatever might be wrong, the cause was in the water itself. Mr. Allen said he and others had inspected the filtering-beds and found in the upper beds at Lisvane a certain amount of decayed vegetable matter; those at Llanishen being clear and the water in the reservoir sweet. They had tasted the water before it went through the filter into the reservoir, and it was all right; but when they tasted it after it had passed through, they found it smelt. He thought, however, that the water was right enough now. Mr. Priestley declared that the reservoir was certainly not polluted in the proper sense of the word. The same condition was found in almost every reservoir in the country. The Chairman (Alderman D. Jones) pointed out that the Borough Analyst had tested the water, and reported that the smell was due to vegetable organism of a peaty character coming down to the reservoir from the Taff Fawr. It was decided to send samples of the water for analysis to Dr. Frankland.

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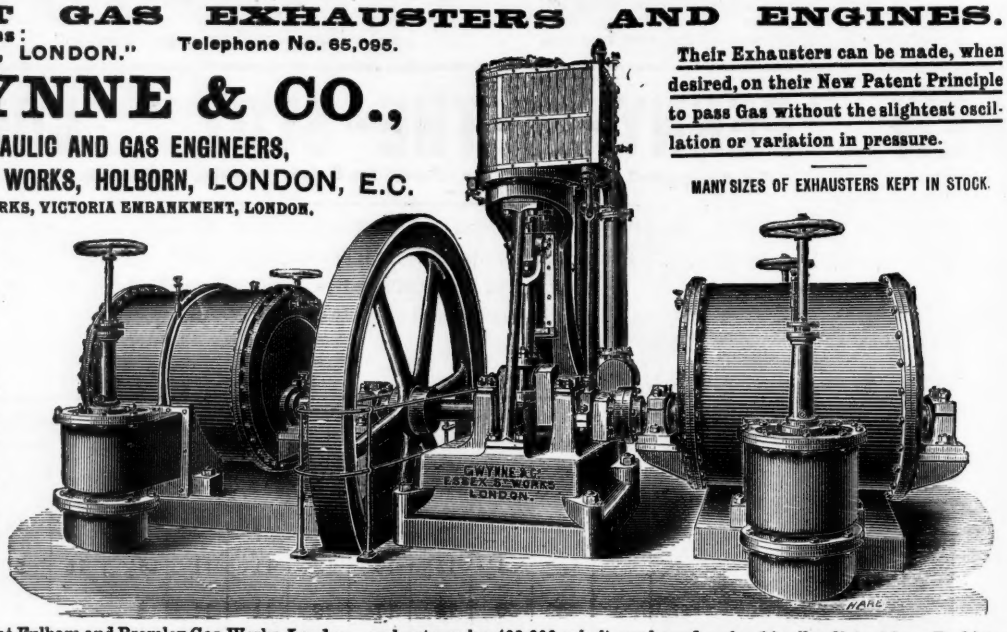

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Two or three times as rich as Bog Ore.
Strong action on Sulphuretted Hydrogen.
To be used alone, but will increase activity of other Oxides.
Less than half the price of Bog Ore.
Can be lent on hire.
Write for tabulated results.

READ HOLLIDAY AND SONS, LIMITED, HUDDERSFIELD.

GAS PURIFICATION AND CHEMICAL COMPANY, LIMITED.

OXIDE OF IRON.

O'NEILL'S Oxide has a larger annual sale in the United Kingdom than all other Oxides combined. Purity and uniformity of quality guaranteed. Pamphlet, "How to Purchase Bog Ore," to be obtained on application.

JOHN WM. O'NEILL, Managing Director,
Palmerston Buildings, Old Broad Street, London, E.C.

ANDREW STEPHENSON, AGENT. All communications re Oxide to be addressed to Palmerston Buildings.

WINKELMANN'S "VOLCANIC" CEMENT. Fire Resistance up to 4500° Fahr. In use in most Continental Gas-Works, and in more than 300 British Gas-Works.

ANDREW STEPHENSON,
182, GRESHAM HOUSE,
OLD BROAD STREET,
LONDON, E.C.

Telegrams: "Volcanism, London."

AMMONIACAL LIQUOR Wanted.
BROTHERTON AND Co., Ammonia Distillers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

GAS TAR Wanted.
BROTHERTON AND Co., Tar Distillers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

SPENT OXIDE Wanted.
BROTHERTON AND Co., Chemical Manufacturers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

SULPHURIC ACID for Sale.
BROTHERTON AND Co., Chemical Manufacturers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

BROTHERTON & CO.
Offices: Commercial Buildings, LEEDS.
Correspondence invited.

SULPHATE OF AMMONIA SATURATORS.

JOSEPH TAYLOR & CO., Chemical Plumbers, &c., and Makers of every description of Solid Plate Lead and Timber Cased Saturators, &c. CENTRAL PLUMBING WORKS, TOWN HALL SQUARE, BOLTON. Special Attention to Repairs.
Before placing Orders, please write for Estimate.

YOUNG Man (married), very steady, requires Situation in Gas-Works as STOVE FITTER and REPAIRER, outside work. Present Situation, over Eight Years. Very handy at all outside work. Wants to better himself. Good Character.
Apply I. A. C., 69, Montpelier Road, PECKHAM, S.E.

WANTED, a Situation as Gas Manager or ASSISTANT in Gas-Works. Four Years' Experience in Gas-Works. Five Years Assistant in Water Engineer's and Burgh Surveyor's Office, and Four Years in Mechanic's Shop. Good Draughtsman and Chemist. Highest References.
Address No. 2683, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

ADVERTISER (aged 36) seeks re- engagement as MANAGER or FOREMAN in Gas-Works. Has 21 years' experience; is a thorough practical Man, well up in detail both in Manufacture and Distribution, and fair Draughtsman. No objection to go abroad. Speaks Spanish and Portuguese. Has excellent Testimonials for past Management.
Address No. 2676, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

AGENT wanted, with good Connection among Gas Companies in London and District, for the Sale of Scotch Cannel Coals.
Apply, by letter, to No. 2682, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

RETORT-HOUSE Foreman Wanted for a Gas-Works in Yorkshire, where about 30,000 Tons of Coal are Carbonized per Year. Wages, £2 per week. Preference will be given to one having had experience with Regenerative Furnaces and Stoking Machinery.
Applications to be sent to No. 2680, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WORKING FOREMAN.

WANTED, by the Shotley Bridge and Consett District Gas Company, a practical WORKING FOREMAN to lay Mains and Services, fix Meters, and do General Outside Work. The person appointed will be required to reside in a central part of the District, and to enter upon his duties the second week in August. Age not to exceed 40 years. Wages, 40s. per week.
Applications to be sent to the undersigned not later than the 27th inst.

M. RICHLEY,
Secretary.

WANTED, at once, for a small Gas- Works connected with a Factory, a good second-hand GASHOLDER, 16 feet to 18 feet diameter. Quotations and Specifications for new one also invited.
Apply to the CHEDDAR VALLEY MANUFACTURING COMPANY, Cheddar, SOMERSET.

GAS PLANT.

WANTED, good Second-Hand Gas- HOLDER, 16 feet to 18 feet diameter.
Apply, by letter, giving full Particulars, Make, and Price, to No. 2675, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

J. & J. BRADDOCK, Globe Meter Works, Oldham.
First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.
Telegraphic Address: "Braddock Oldham."

SULPHURIC ACID.

JOHN NICHOLSON & SONS, Limited, Chemical Works, Leeds, specially produce this ACID from SULPHUR, for making SULPHATE OF AMMONIA of high quality and *good* colour. Delivery in our own Railway Tank-Wagons or Carboys. Highest references and all particulars supplied on application.

PORTER & CO., Gowts Bridge Works, LINCOLN, Engineers, Ironfounders, and Contractors for the erection of Gas-Works for, Towns, Villages, Mansions, Manufactories, Collieries, and Isolated Buildings, at home and abroad. Manufacturers of Retorts and Fittings, Condensers, Scrubbers, Purifiers, Valves, &c.; also of Girders, Wrought and Cast Iron Tanks, Iron Roofs, &c.
Telegraphic Address: "PORTER LINCOLN."

SADLER & Co., Ld., Middlesbrough; ULVERSTON (BARROW); PORTSMOUTH; CARLTON (N.E.R.); and STOCKTON. Tar and Petroleum Distillers. Benzol and Petroleum Spirit, 700 and other Gravities specially prepared for Carburetting. SOLAR OIL for Gas Making Kerosene, &c.
Correspondence invited.
Telegraphic Address: "Sadler, Middlesbrough."

SPECIAL PAINT FOR GAS-WORKS.

JOHN E. WILLIAMS AND CO.,
VICTORIA PAINT WORKS.
MANCHESTER.
Telegrams: "ENAMEL." National Telephone 1759.

It is Worth Your While to Buy DIRECT.
THE RELIANCE LUBRICATING OIL COMPANY SUPPLY on APPROVAL "RELIANCE" NON-CORROSIVE LUBRICANTS (which, through their superiority, have the largest sale in the world)—viz., Engine, Cylinder, and Machinery Oils, 11½d.; Spindle Oil, 8½d.; Gas-Engine and Dynamo Oils, 1s. 6d. per gallon; Barrels Free and Carriage Paid. Also Liquids for Gas Making, Enriching, &c.
RELIANCE LUBRICATING OIL COMPANY,
WATER LANE, GREAT TOWER, LONDON, E.C.
Depôts at Liverpool, Bristol, Hull, Glasgow and Newcastle-on-Tyne. Telegrams: "Subastral, London."

PURIFIERS—Two Wanted, 8 feet by 6 feet, 6-inch Connections.
GAS-WORKS, Stevenston, AYRSHIRE.

"JOURNAL" INDICES WANTED.

A SUBSCRIBER to the "Journal" desires to obtain Indices for Vols. 45, 48, 60, 61, and 62, and invites Offers from any person having them for disposal.
Address No. 2684, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

FOR SALE—Three 8 feet square PURIFIERS with T-Bars, Sieves, Wrought-Iron Lids, Lifting-Screw, 6-inch Connections, and Donkin's Valves. All in first-rate condition, and ready for re-erection.
Address No. 2681, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

FOR SALE—One Rotary Engine and EXHAUSTER, to pass 35,000 cubic feet of Gas per Hour, with Governor, &c., complete. One DEMPSTER'S HORIZONTAL ENGINE and EXHAUSTER, with double Cylinder, to pass 35,000 cubic feet of Gas per Hour, with Governor Connections. Also about 360 feet of 18 in. by 18 in. HYDRAULIC MAIN, with 5-inch Stand-Pipes, Bridge-Pipes, Mouthpieces, &c.
The above are all in good condition, are suitable for smaller Gas-Works, and are being replaced by Apparatus of larger size.
The apparatus may be seen, or any further Information obtained, on application to Mr. William Smith, Gas Engineer, Lum Street Gas-Works, Bolton.
Gas Offices, Bolton,
June 2, 1896.

THE Gas Committee of the Keighley Corporation are prepared to receive TENDERS for the supply of 270 Tons of SULPHURIC ACID during the next Twelve Months.
Particulars and Form of Tender may be obtained on application to the undersigned.
Tenders, addressed to the Chairman of the Gas Committee, to be sent in not later than Monday, the 27th inst.

By order,
JOHN LAYCOCK, Engineer.

CORPORATION OF LEICESTER.

TENDERS FOR PURIFIER GRIDS.

THE Gas and Electric Lighting Com- mittee of the above Corporation are prepared to receive TENDERS for the Supply and Fixing of GRIDS for five Purifiers, 32 feet square, at the Aylestone Road Works.
Particulars and Form of Tender can be obtained on application to the Engineer.
Tenders, addressed to Alderman Lennard, Chairman, and endorsed "Tender for Purifier Grids," to be delivered at these Offices not later than Eleven o'clock a.m. on Saturday, the 8th of August next.
The Committee do not bind themselves to accept the lowest or any tender.

ALFRED COLSON, M.Inst.C.E.,
Engineer and Manager.
Offices: Millstone Lane, Leicester,
July 20, 1896.

GAS PURIFICATION.

OXIDE OF IRON BOG ORE.

BALE & CO.'S Oxide of uniform quality. Sample and Price on application.
OXIDE PAINTS, OILS, SULPHURIC ACID, &c.
120 and 121, NEWGATE STREET, LONDON, E.C.
Telegrams: "BOGORE, LONDON."

OXIDE OF IRON.

FINEST Quality of Natural Bog Ore. Particulars and price, apply to Mr. T. L. ARCHER, 20, Fennel Street, MANCHESTER.

SPENT OXIDE Wanted.
J. HARDMAN, Milton, STAFFS.

SULPHURIC ACID for Sale (B. O. V. and R. O. V.) made from Spent Oxide.
J. HARDMAN, Chemical Works, Milton, STAFFS.

CANNEL, COAL, ETC.

JOHN ROMANS & SON, EDINBURGH, Gas Engineers, supply all the most approved SCOTTISH CANNELS; also FIRE-CLAY GOODS, CAST-IRON PIPES, and other APPARATUS for GAS and WATER WORKS.
Prices, &c., will be forwarded on application to No. 30, ST. ANDREW SQUARE, EDINBURGH, / NEWTON GRANGE, NEWBATTLE, DALKEITH, } SCOTLAND.

MACCLESFIELD CORPORATION.

THE Gas Committee are prepared to receive TENDERS for the supply of 100 Tons of OXIDE OF IRON, for Purifying the Gas at their Works.
Further Particulars may be obtained on application to the Engineer.
Sealed tenders, endorsed "Oxide of Iron," and addressed to the Chairman of the Gas Committee, Town Hall, to be delivered not later than Ten a.m., on the 25th of July, 1896.

By order,
W. F. TAYLOR,
Town Clerk.
Town Hall, Macclesfield,
July 13, 1896.

CITY OF LEEDS.
(GAS DEPARTMENT.)

THE Gas Committee of the Leeds City Council are prepared to receive TENDERS for the various Works—Bricklayers, Ironfounders, Slating, Plumbing—required in the erection of a RETORT-HOUSE at the Meadow Lane Gas-Works.
Plans can be seen, and Specification and Bills of Quantities obtained, on application to the undersigned.
Tenders, suitably endorsed, and addressed to the Chairman of the Gas Committee, Municipal Buildings, Leeds, will be received not later than Saturday, the 25th inst.
The Committee do not bind themselves to accept the lowest or any tender.

R. H. TOWNSLEY,
General Superintendent.
Gas Department, Municipal Buildings,
Leeds, July 16, 1896.

ROCHESTER, CHATHAM, AND STROOD GAS-LIGHT COMPANY.

STEEL GAS-MAIN.

THE Directors are prepared to receive TENDERS for 750 feet run of 18-inch lap-welded STEEL TUBES, and sundry 18-inch CAST-IRON BENDS.
Tenders, endorsed "Steel Main," to be delivered to the undersigned, on or before noon of Thursday, the 30th of July, 1896.
Specification and further Particulars may be obtained on application at the Offices of the Company, 95, High Street, Rochester.
The Directors do not undertake to accept the lowest or any tender.

J. M. VREVERS,
Engineer and Secretary.
Gas Offices, Rochester,
July 16, 1896.

COMMERCIAL GAS COMPANY.

THE Directors of the Commercial Gas Company are prepared to receive TENDERS for the surplus BREEZE produced at their several Works for the Twelve Months ending the 31st of July, 1897.
The quantities are estimated to be as under, but the same cannot be guaranteed, and may be more or less:

At the Stepney Works, in the Regent's Canal—
2500 chaldrons (of 48 bushels) of Fine Coke Breeze, and
2500 chaldrons (of 48 bushels) of Rough Pan Breeze.

At the Wapping Works, on the River Thames—
2000 chaldrons (of 48 bushels) of Fine Coke Breeze, and
2000 chaldrons (of 48 bushels) of Rough Pan Breeze.

At the Poplar Works, in Bow Creek (free waterway)—
4000 chaldrons (of 48 bushels) of Fine Coke Breeze, and
4000 chaldrons (of 48 bushels) of Rough Pan Breeze.

The tenders may be for the whole or for one or more Works separately.
The Contractors must give security to remove the Breeze as it accumulates, to pay for the same monthly, and generally for the due fulfilment of the contract.
The form of agreement to be signed can be seen at the Company's Offices.
Tenders, sealed and endorsed "Tender for Breeze," to be delivered here not later than the 30th of July inst.
The Directors reserve to themselves the right to accept any tender in part or in whole, and do not bind themselves to accept the highest or any tender.
Commercial Gas-Works, Stepney, E.,
July 16, 1896.

SURPLUS TAR.

THE Directors of the Ashford (Kent) Gas and Coke Company, Limited, are prepared to receive TENDERS for the purchase of the surplus TAR produced at their Works for One, Two, or Three Years from the 1st of September next. 30,000 gallons will be the approximate quantity.

Payments to be made monthly.

Tenders, endorsed "Tender for Tar," to be delivered at my Office, 11, Bank Street, Ashford, Kent, on or before Aug. 10, 1896.

F. HUGHES-HALLETT,
Secretary.

OSWALDTWISTLE URBAN DISTRICT COUNCIL.

THE Gas Committee invite Tenders for the TAR and LIQUOR produced at their Works for One Year from the 31st day of July, 1896.

The quantity of Coal carbonized is about 3500 Tons.

Further Particulars may be obtained from the Manager, Gas-Works, Church, near Accrington.

Tenders, endorsed "Tender for Tar," to be addressed to me, and to be delivered not later than Wednesday, the 29th of July.

WM. SANDEMAN,
Clerk.

District Council Offices,
Oswaldtwistle, June 26, 1896.

The LIST will OPEN on MONDAY, July 20th, and CLOSE on or before WEDNESDAY, July 22nd, for Town and Country.

THE British Gas Traction Co., Limited,

Incorporated under the Companies Acts, 1862 to 1890.

CAPITAL - - £250,000,

In 50,000 Shares of £5 each.

Of which 10,000 are taken by the vendors in part payment, and the residue of 40,000 are now offered for Subscription, payable as follows:—

On Application	**£0**	**10**	**0**	**per share**
On Allotment	**0**	**10**	**0**	**,,**
***Two months after Allotment**	**2**	**0**	**0**	**,,**
***Four months after Allotment**	**2**	**0**	**0**	**,,**

*** Due notice will be given of the date on which these instalments are payable.**

DIRECTORS:

Lieut.-Colonel W. T. ELLIS, Director, the Incandescent Gas-Light Company, Limited.

THOMAS SKARRATT HALL, Esq., 23, Berkeley Square, W.

HENRY P. HOLT, Esq. (Crossley Bros., Limited), Manchester and London.

THOMAS G. GILLESPIE, Esq., Director the London Tramways Company, Limited.

ALFRED DU CROS, Esq., Dunlop Pneumatic Tyre Company, Limited.

BANKERS:

LLOYDS BANK LIMITED, 222, Strand, London, and other Branches, and their Agents in Ireland.

The BANK OF IRELAND, Dublin, and Branches.

SOLICITORS:

Messrs. DAWES AND SONS, 9, Angel Court, London, E.C.

J. B. PURCHASE, Esq., 11, Queen Victoria Street, London, E.C.

AUDITORS: Messrs. FRANK DAVIES, MEREDITH, AND CO., 95 and 97, Finsbury Pavement, E.C.

BROKERS: Messrs. ALISTAIR HAY AND CO., 5, Lothbury, E.C.

SECRETARY (*pro tem.*): PERCY HOLYOAKE.

REGISTERED OFFICES: 23, Chancery Lane.

PROSPECTUS.

THIS COMPANY has been formed for the purpose of acquiring, working, developing, or otherwise dealing with the British patent rights, including all improvements thereon, for Great Britain and Ireland, for the system of working tramways, light railways, &c., by means of Motor Cars worked by Gas-Engines, invented by the late Carl Lührig, of Dresden, and Mr. Henry P. Holt.

Amongst the principal objects of the Company are to build and sell Gas Motor Cars in Great Britain, and to equip and work Tramway Lines by contract.

The cars are similar in appearance to ordinary horse tramcars, and are propelled by specially constructed gas-engines. The engines and driving gear are so arranged that no part of them is seen, and they do not encroach on the space for carrying passengers; no inconvenience arises from noise or vibration of machinery, and the car runs as smoothly as a horse-car. There is no smell from either gas or oil. As evidence of the safety with which gas traction can be worked, it may be stated that during the years 1894-5 there were at Dresden 212 accidents with horse cars, 88 accidents with electric cars, but not a single accident with gas motor cars.

The advantage in this system (apart from the diminution in cost) is that each car carries its own power, and is thus in no wise dependent upon a central station as in the case of electric and cable lines, where, if any accident occurs, the whole traffic is stopped.

The danger, inconvenience, and unsightliness of overhead electric circuits are avoided.

A further consequence, which is of immense economical value in facilitating the adoption of the system, is that the whole of the fixed plant can be obtained at the moderate cost of £300 to £400, and that no special form of line is required. The cars can thus be tried on any properly laid tramway at a trifling expense, and can be adopted to the extent found convenient. The system has been thoroughly tested in Germany. Five cars were put in traffic in Dresden in 1894; and their successful working is attested by the Managing Director of the Tramway Company in the following letter:—

"*Dresden, Feb.* 8, 1896.

"TO THE GAS TRACTION COMPANY, LIMITED,
London and Dresden.

"Dear Sirs,—In reply to your inquiry, we have pleasure in confirming that the five gas motor cars have been worked here successfully since July, 1891. The cars are the first ones built according to your system, and are of a somewhat old design; but although they have been worked on a most difficult line with five railway lines to cross, they have done their work successfully, and are in good condition.

"These satisfactory results have induced us to build further lines for working with gas-cars as soon as those with your latest improvements are ready.

"For the Deutsche Strassenbahn-Gesellschaft,
(Signed) "STOESSNER, Director."

In Dessau a Company was formed, and a line laid down, and fully equipped, on this Company's system. It was opened for traffic in November, 1894, with nine cars. It worked so satisfactorily that, in the early part of 1895, the public agitated for the construction of further lines to connect other parts of the town. The Company decided to do so, and the requisite capital was subscribed in the town of Dessau alone. The Managing-Director's report of this Company and statement of accounts for the year ending 31st December, 1895, are published, and show a satisfactory profit on the first year's working. The result of the year's running up to December, 1895, as shown by the published accounts, proves conclusively the cheapness of the system as against every other mode of traction, the cost per mile for gas, including compression; being less than one penny, with gas at 2s. 11d. per 1000 cubic feet.

In Dresden, according to the accounts of the Tramway Company, the cost of the three modes of traction which are worked by them is given for the year 1895 as follows:—

Single horse cars	5¾d. per mile.
Electrical cars with overhead wires. .	4¼d. ,,
Gas cars	3¼d. ,,

It will thus be seen that the cost of traction by gas is much less than by any other known mode of traction.

It must be borne in mind that this result is obtained without the large initial expenditure on fixed plant required in all other systems of mechanical traction, since a small compressing station is all that is necessary.

A contract has been entered into with the Blackpool, St. Anne's, and Lytham Tramway Company for the supply of cars and for working their system by gas traction, the benefit of which will be transferred to this Company.

From the last Board of Trade returns, the total mileage run by tramcars in the United Kingdom was over 75,000,000 miles. Of these about 66,000,000 miles were worked by horse traction. Supposing that gas-cars were used for one-eighth of the last-named mileage—say, 8,000,000 miles per annum—this would, at 2d. per mile saving, give an increased profit of over £68,000 per annum.

Professor A. B. W. Kennedy, LL.D., F.R.S., in exhaustive reports upon the Company's system of traction, states:—

"The comparatively small capital expenditure, as well as the ease with which the system can be used on existing lines if they are reasonably well built, the fact that gas is everywhere available, and that in many cases the gas belongs to the corporation to whom the tram-lines may also ultimately belong, are all points very much in its favour. Until now it has no doubt been a question whether a scheme which looked so promising on paper, and in experiments, could stand the rough usage of actual work. So far as I can judge, the experiments in Dessau answer this question definitely and satisfactorily.

"I have to-day (17th July, 1896) inspected the gas-cars at Blackpool, and am pleased to find their running very satisfactory, and even a distinct advance on the results at Dresden and Dessau."

In addition to the above, Mr. Corbet Woodall, M.Inst.C.E., has also favourably reported upon the system and working.

Mr. John Imray, of Messrs. Abel and Imray, Patent Agents, having examined the specifications of the Company's patents, says—

"From what I have seen of the working of the patented cars, and from what I know as to the proposed improvements, I am satisfied that there is a great future for this undertaking; and I consider that the inventions embodied in it will be well secured."

The following letters have been addressed to the Solicitors by Mr. J. Fletcher Moulton, Q.C., and Mr. R. W. Wallace, Q.C.

"11, *King's Bench Walk*,
"*Temple, July* 15th, 1896.

"Dear Sirs,—It is impossible for me to advise upon the validity of the English patents owned by the Gas Traction Company, Limited, because I am a considerable shareholder in that Company, and take a large interest in its proceedings. Indeed, the original purchase of the patents was made under my advice; and the numerous patents that have been taken out by or on behalf of the Company have been drawn up or settled by me, so that substantially I should be advising upon what I have myself done.

(Signed) "J. FLETCHER MOULTON,"

2, *Harcourt Buildings*,
"*Temple, July* 15*th* 1896.

"Dear Sirs,

"*Re* The Gas Traction Company's Patents.

"As I myself am largely interested in the Company, I am precluded from advising upon the patents; and I suggest that you should rely upon the opinion already given by Mr. John Imray.

"Yours very truly,
(Signed) "ROGER W. WALLACE.

"Messrs. Dawes and Sons,
9, Angel Court, E.C."

The following contract has been entered into:—

Contract between the Gas Traction Company, Limited (the Vendor Company), and this Company for the sale and purchase of the patents and patent rights for Great Britain and Ireland for traction by motor cars and the benefit of the agreement with the Blackpool, &c., Company above referred to.

The purchase price has been fixed by the vendor Company at £105,000, payable as to £55,000 in cash, and as to £50,000 in fully-paid shares. The vendor Company pays all the expenses of the formation of the Company and preliminary expenses of every kind up to the first general allotment.

A print of the Memorandum and Articles of Association, the sale and purchase agreement, and the agreement with the Blackpool, &c., Company, the originals of the reports of Professor Kennedy, Mr. Corbet Woodall, of Messrs. Abel and Imray, and of the Managing-Director of the Dresden Tramway Company, and the originals of the letters from Messrs. Moulton and Wallace, and Herr Stoessner can be seen at the Offices of the Solicitors of the Company.

It is intended to apply for an official quotation and settlement of the present issue on the London Stock Exchange.

Applications for shares should be made on the accompanying form, and forwarded to the Company's bankers, together with a remittance for the amount payable on application. If the number of shares allotted be less than that applied for, the surplus will be credited in reduction of the payments on allotment, so far as necessary, and any balance will be returned. Where no allotment is made, the deposit will be returned in full. Failure to pay any instalment will render all payments previously made liable to forfeiture.

Prospectuses and Application Forms may be obtained from the Bankers and Brokers and at the Company's Office.

July 18th, 1896.

FORM OF APPLICATION.

THE BRITISH GAS TRACTION COMPANY, LIMITED.

CAPITAL: £250,000, in 50,000 Ordinary Shares of £5 each, payable 10s. per share on application, 10s. per share on allotment, £2 per share two months after allotment, and £2 per share four months after allotment.

To the Directors of the BRITISH GAS TRACTION COMPANY, Limited.

Gentlemen,—I request you to allot me..... shares of £5 each in the above-named Company; and I agree to accept the same or any smaller number that may be allotted to me, subject to the Memorandum and Articles of Association, and upon the terms of the Prospectus issued by you dated the 18th July, 1896. I authorize you to place my name upon the register of members in respect of the shares so allotted to me; and I agree to pay the further instalments upon such allotted shares as the same shall become due.

I enclose a cheque for £....., being the deposit of 10s. per share payable on application.

Full Name .....

Ordinary Signature.....

Please write distinctly, and give Full Permanent Address.

Description or occupation .....

Address.....

.....

Date .....

SOUTH METROPOLITAN GAS COMPANY.

NOTICE is Hereby Given, that the ORDINARY HALF-YEARLY GENERAL MEETING of the Proprietors of this Company will be held at the Bridge House Hotel, London Bridge, in the Borough of Southwark, on Wednesday, the 12th day of August next, at Two o'clock in the afternoon precisely, to receive the Directors' Report, and the Accounts of the Company for the Half Year ended the 30th of June last, and to declare a Dividend for the same period.

Notice is Hereby also Given, that the Directors will, pursuant to the Scheme of Amalgamation, 1884, submit a RESOLUTION to the Proprietors for the purpose of authorizing the SALE of certain LANDS, which are no longer required for the purposes of the Undertaking.

The TRANSFER BOOKS WILL BE CLOSED from the 29th day of July, until after the Meeting.

FRANK BUSH,
Secretary.

Offices: 709A, Old Kent Road, S.E.,
July 18, 1896.

HORNSEY GAS COMPANY.

NOTICE is Hereby Given that the ORDINARY GENERAL MEETING of the Shareholders of this Company will be held at the Offices of the Company, No. 63, Chancery Lane, in the County of Middlesex, on Friday, the 7th day of August, 1896, at 3.30 o'clock in the Afternoon precisely, to receive a Report from the Directors, declare Dividends, and transact the Ordinary Business of a General Meeting.

The TRANSFER BOOKS WILL BE CLOSED on the 24th of July until after the General Meeting.

By order of the Board,
S. J. WILLIAMS,
Secretary.

Offices: 63, Chancery Lane, London, W.C.,
July 16, 1896.

SOUTHWARK AND VAUXHALL WATER COMPANY.

SALE BY TENDER OF £100,000 THREE PER CENT. DEBENTURE STOCK.

NOTICE is Hereby Given, that it is the intention of the Directors of the Southwark and Vauxhall Water Company TO SELL BY TENDER, to be received at the Company's Office, Southwark Bridge Road, S.E., not later than Twelve o'clock noon, on Tuesday, the 28th day of July, 1896, £100,000 DEBENTURE STOCK of the Company.

The Stock now for sale is the first portion of the Capital authorized by and to be issued under the provisions of the Southwark and Vauxhall Water Act, 1894, and will be entitled from the 30th day of September, 1896, to interest at the rate of 3 per cent. per annum. It will be known as Debenture Stock "B," and may be redeemed at par at any time after the expiration of 25 years from the date of issue, subject to six months' previous notice of the intention to redeem. Debenture Stock "B" will rank for Interest and otherwise *pari passu* with the other Debenture Stock of the Company, but before the Ordinary and Preference Stock and Share Capital. It is a lawful investment for trustees.

For Particulars, Forms, and Conditions of Tender, apply at the Office of the Company, Southwark Bridge Road, S.E.

By order of the Board of Directors,
MONTAGUE WATTS,
Secretary

Southwark Bridge Road, S.E.,
July 14, 1896.

ISSUE OF STOCKS AND SHARES BY AUCTION UNDER PARLIAMENTARY POWERS.

MR. ALFRED RICHARDS undertakes the issuing by Auction of GAS AND WATER SHARES under Parliamentary Powers.

He also holds MONTHLY SALES of GAS AND WATER SHARES at the Auction Mart, Tokenhouse Yard, E.C.

Terms for the issuing of Capital, and also for offering to auction Gas and Water Shares, and all Particulars relating thereto, may be had of Mr. Alfred Richards.

Offices: 18, FINSBURY CIRCUS, E.C.

SALE ON MONDAY, JULY 27.

STOCKS AND SHARES IN GAS AND WATER COMPANIES AS FOLLOWS:—

Portsea Island Gaslight Company.
Barnet District Gas and Water Company.
Bournemouth Gas and Water Company.
Croydon Commercial Gas and Coke Company.
Southend Gas Company, Romford Gas and Coke Company, Limited, Goring and Streatley District Gas and Water Company, Walton-on-Thames and Weybridge Gas Company, and Grays Gas Company.

To be SOLD by AUCTION by

MR. ALFRED RICHARDS, at the Mart, London, E.C., on Monday, July 27, at Two for a quarter past Two, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors.

TO TRUSTEES AND INVESTORS.

NOTICE OF SALE BY AUCTION BY

MESSRS. CRAWTER, at the Falcon Hotel, Waltham Cross, on Thursday, July 23 1896, at Six for Seven o'clock precisely, of £3150 PERPETUAL 4 per cent. DEBENTURE STOCK of the Waltham Abbey and Cheshunt Gas and Coke Company.

The last Half-Yearly Dividends have been at the rate of 7 per cent. per annum on the Original Share Capital of the Company. The increase in the Consumption of Gas during the last Four Years amounts to 10 million cubic feet; and, as the neighbourhood is rapidly developing, a further increase of Consumption may confidently be anticipated.

Particulars may be obtained of the SECRETARY of the Company, Waltham Abbey, ESSEX; at the place of Sale; and of Messrs. CRAWTER, Land Agents and Auctioneers, Cheshunt, HERTS.

Price 6s., Cloth Bound,

THE CHEMISTRY OF ILLUMINATING GAS.

By N. H. HUMPHRYS, Assoc. M.Inst.C.E., F.C.S.

This work contains chapters on: The Relative Cost of Light from Gas, Oil, and Candles; Products of Combustion; The Sulphur Question; The Composition of Illuminating Gas; Water Gas; Various Gas-Making Processes; Oil Gas; Properties of Fluid Hydrocarbons; Tar for Gas-Making; Destructive Distillation; Condensation; and Purification.

WALTER KING, 11, Bolt Court, FLEET STREET, E.C.

HEBBURN MAIN GAS COALS.

Yield of Gas per ton . . . . . 10,500 cub. ft.
Illuminating Power . . . . . 16·4 candles.
Coke . . . . . 68 per cent.

For Prices, f.o.b. Ship or Delivered by Rail, apply to

THE WALLSEND & HEBBURN COAL COMPANY, LTD.
8 Lombard Street,
NEWCASTLE-ON-TYNE.
W. RICHARDSON, Fitter.

THOMAS TURTON AND SONS, LIMITED,

SHEAF WORKS, SHEFFIELD,

MANUFACTURERS OF

FILES OF BEST QUALITY FOR ENGINEERS.

STEEL OF ALL DESCRIPTIONS.

SCREW STOCKS, TAPS AND DIES, SPANNERS, RATCHET BRACES, LIFTING JACKS, ANVILS, VICES, AND ENGINEERS' TOOLS GENERALLY.

LONDON OFFICE:
90, CANNON STREET, E.C.

THE INCANDESCENT GAS-LIGHT COMPANY, LIMITED,

— *v.* —

"DE MARE" COMPANY.

THE INCANDESCENT GAS-LIGHT COMPANY, LIMITED.

— *v.* —

"SUNLIGHT" COMPANY.

THE INCANDESCENT GAS-LIGHT COMPANY, LIMITED, HEREBY GIVE NOTICE, as follows:—

VALIDITY. The Company's Patent has been declared VALID ON ALL POINTS after a Fifteen-Day Trial.

NATURE OF INVENTION. The Invention was described by Mr. Justice Wills as a "PIONEER INVENTION."

SCOPE OF PATENT. The Patent HAS BEEN GIVEN A WIDE CONSTRUCTION; and it was held that the protection given by it was not confined to Mantles manufactured according to the particular prescriptions set out in the Specification.

SHAPE OF MANTLE. The Judge held that a Mantle, even if made in a different form or shape (such as the "De Mare" Fringe or Plume), IS STILL AN INFRINGEMENT of the "Welsbach" Patent.

"DE MARE" JUDGMENT. Judgment for an INJUNCTION, WITH FULL COSTS, has been given against the "De Mare" Incandescent Gas-Light System.

"SUNLIGHT" JUDGMENT. Judgment was given AGAINST the "Sunlight" Incandescent Gas-Lamp Company, Limited, on the question of the VALIDITY OF THE PLAINTIFFS' PATENT.

"SUNLIGHT" MANTLES. Last about 100 hours.

"WELSBACH" MANTLES. Last about 1000 hours.

"Sunlight" Mantles BURN DOUBLE THE GAS to produce the same candle power as the Incandescent Gas-Light Company's Mantles.

Users of "Sunlight" Mantles are applying to the Incandescent Gas-Light Company to REPLACE THEM BY THEIR OWN MANTLES.

WARNING. Users of the Incandescent Gas-Light Company's Mantles upon "Sunlight" Burners ARE INFRINGERS OF THE COMPANY'S PATENT, AND WILL BE AT ONCE PROCEEDED AGAINST.

COSTS. Certificates of the Validity of the Company's Patent have been granted both by Mr. Justice Romer and Mr. Justice Wills entitling the Company to Solicitor and Client Costs, which will, IN ALL CASES, BE RIGOROUSLY ENFORCED.

INFRINGERS. The Incandescent Gas-Light Company WILL TAKE PROCEEDINGS AGAINST ALL PERSONS INFRINGING THEIR PATENT, WHETHER MAKERS, WHOLESALE DEALERS, RETAILERS, or USERS.

Users of the Company's Mantles upon Burners not sold by the Company ARE INFRINGERS.

"LIMITED LICENSE" WARNING. Judgments have already been obtained against such users from Mr. Justice Chitty, Mr. Justice Stirling, Mr. Justice Kekewich, and Mr. Justice North.

FAITHFULL & OWEN,
11, Victoria Street,
Westminster.
Solicitors to the Incandescent Gas-Light Company, Limited.

April, 1896.

NOTICE.

The attention of the METEOR INCANDESCENT LIGHTING COMPANY, LIMITED, having been again called to the Advertisements inserted in various papers by the Incandescent Gas-Light Company, Limited, of Palmer Street, Westminster, to the effect that the "Meteor" Incandescent Gas-Lights are an Infringement of their Patents, and that they will bring Actions for Infringement against all persons found dealing in any manner with such Lights, the METEOR INCANDESCENT LIGHTING COMPANY, LIMITED, HEREBY GIVE NOTICE that they are advised that the "Meteor" Incandescent Lights in no way infringe any of the Patents of the Incandescent Gas-Light Company, Limited, that an action has been commenced to restrain such threats, and that they are PREPARED TO FULLY INDEMNIFY ALL PURCHASERS, DEALERS, AGENTS, and USERS of their Lights against any Legal Proceedings on the part of the Incandescent Gas-Light Company, Limited.

WILSON, BRISTOWS, & CARPMAEL
1, Copthall Buildings, London, E.C.,
Solicitors to the Meteor Incandescent Lighting Company, Limited, of 35, New Broad Street, London, E.C.

Nov. 30, 1895.

Fcap. 4to, Cloth, price 7s. 6d., post free.

Practical Photometry.

By William Joseph Dibdin, F.I.C., F.C.S.

LONDON: Walter King, 11, Bolt Court, Fleet St., E.C.

NEWBATTLE CANNEL.

Highest Results in Gas, & Excellent Coke.

QUOTATIONS ON APPLICATION TO

THE LOTHIAN COAL COMPANY,

LIMITED,

NEWBATTLE COLLIERIES,

DALKEITH, N.B.

HUNTER'S

OXIDE OF IRON.

JAMES HUNTER, MINER, AND SHIPPER OF NATURAL IRISH BOG ORE.

This Estate yields the finest and most uniform quality in Ireland; and the quality is guaranteed.

Samples and Prices on application.

5, PRINCES STREET, PORT GLASGOW.

Telegrams: "HUNTER, PORT GLASGOW."

Established 1872.

UNEQUALLED.

Gas Companies are solicited to try Samples of the

MIRFIELD

BLACK BED GAS COAL.

Prices and Analysis on application.

MIRFIELD (GAS-COAL) COLLIERY COMPY.

RAVENSTHORPE, NEAR DEWSBURY.

THE DRUM

FOR PUMPING AIR, WATER, SEMI-FLUIDS, &c.

See Advertisement in last and next issue.

THE SILICA FIRE-BRICK COMPANY,

OUGHTIBRIDGE, near SHEFFIELD,

MANUFACTURE

SILICA BLOCKS, BRICKS, AND CEMENT

OF SUPERIOR QUALITY

FOR GAS-FURNACES.

Trade Mark: "SILICA."

These Goods (largely used in Gas, Glass, Iron, and Steel Works) are, on account of their

GREATER DURABILITY,

Strongly recommended where EXCESSIVE HEATS have to be maintained.

FACE YOUR RETORT MOUTHPIECES.

Main Drilling Stand, with Cup Drills, ¼ to 4 inch; Taps, Rymers, and Drills.

JOHN RUSCOE calls attention to his Retort Mouthpiece and Lid Facing Machines, which are in extensive use; also to his Lathes, Drilling, Slotting, Grooving and Planing Machines, Smiths' Hearths, Smithy Fans, Roots' Blowers; also special Screwing-Machines for Gas Tubes and Bolts, Taps, Wrenches, Pipe-Cutters; Special Taper and Twisted Rymers, Drills, &c.

Ratchet Screwing Stocks and adjustable once-up Stocks, Dies, Guides, &c.

For Prices, References, and other Particulars, apply to the Patentee and Manufacturer,

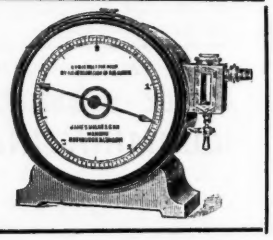
JOHN RUSCOE, ALBION WORKS, HYDE, near MANCHESTER.

JAMES MILNE & SON, LTD.,

GAS ENGINEERS,

MILTON HOUSE WORKS, EDINBURGH.

LONDON. — GLASGOW. — LEEDS.



THE WIGAN COAL & IRON CO., LIMTD.,

Are exclusive Owners of the well-known HAIGH HALL & KIRKLESS HALL GAS COAL COLLIERIES, and supply the Best Wigan Arley Mine Gas Coal, Gas Nuts, Gas Cannel, Cannel Nuts, &c.

Midland District Office: PRINCE'S CHAMBERS, 6, CORPORATION STREET, BIRMINGHAM—Sole Agent: A. C. SCRIVENER.

TELEGRAPHIC ADDRESS: "WIGAN BIRMINGHAM." TELEPHONE No. 200.

London District Office: 6, STRAND, LONDON—C. PARKER & SON, Sole Agents.

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THE "SIMPLEX" CARBURETTER

W. E. PRICE'S PATENT.

A NEW AND PERFECT METHOD OF ENRICHING GAS IN LARGE OR SMALL QUANTITIES AT A MOMENT'S NOTICE.

Special Features of the "SIMPLEX"—

SIMPLICITY, PERMANENCE OF RESULTS, CHEAPNESS, AND ENTIRE ABSENCE OF CONDENSATION.

For Prices and further Particulars, apply to the Manufacturers,

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TROTTER, HAINES, & CORBETT,

Brettell's Estate

FIRE-CLAY & BRICK WORKS,

STOURBRIDGE.

Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.

Proprietors of

BEST GLASSHOUSE POT & CRUCIBLE CLAY.

SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.

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PRICE'S COKE & COAL BARROW

effecting a great saving of time, labour, and expense.

For Particulars, Price, &c., apply to Mr. EDWARD PRICE, 119, Queen's Road, FINSBURY PARK, N.

Prices are Reduced.

LONDONDERRY GAS COALS

FROM THE

MARQUIS OF LONDONDERRY'S COLLIERIES,

COUNTY OF DURHAM.

Available output up to 5000 tons per day.
Yield of Gas 11,000 cubic feet per ton of Coal as per analysis by Mr. John Pattinson, F.C.S., F.I.S.

FOR PRICES AND PARTICULARS, APPLY TO

S. J. DITCHFIELD,

SEAHAM HARBOUR, COUNTY OF DURHAM.

HOLMSIDE GAS COALS.

PRESENT DAILY PRODUCE OVER 4000 TONS.

LATEST ANALYSIS—By CHARLES PHILLIPS, Gas Examiner to Rotherham Corporation.

Yield of Gas Per Ton . . 11,205 Cubic Feet.
Illuminating Power, 16 7/10 Stand. Sperm. Candl.
Coke (of good & pure quality) 18¾ Cwt. Per Ton.
Sulphur . . . . A little over 1 Per Cent.
Ash . . . . . Under 1 Per Cent.
Tar . . . . . 163 Lbs. (Avoir.) Per Ton.
Ammoniacal Liquor 103 Lbs. (Avoir.) Per Ton.

HOLMSIDE GAS COALS are supplied to the largest Gas Companies in England and on the European Continent; London alone consuming about half the produce.

SOUTH MOOR PELTON GAS COALS.

PRESENT DAILY PRODUCE AVAILABLE 2500 TONS.

RESULTS OF DIFFERENT ANALYSES:—

Yield of Gas Per Ton . . 10,500 Cubic Feet.
Illuminating Power . 17 Stand. Sperm Candl.
Coke (of excellent quality) . 13½ Cwt. Per Ton.
Sulphur . . . . . 1·13 Per Cent.
Ash. . . . . 1·34 Per Cent.
Tar. . . . . 180 Lbs. (Avoir.) Per Ton.
Ammoniacal Liquor 94½ Lbs. (Avoir.) Per Ton.

The HOLMSIDE and SOUTH MOOR COALFIELD possesses *a very great quantity of the best Coal;* and, whilst other Coal-Fields are becoming exhausted, this one is only being opened out, so that *the quality* of both the HOLMSIDE COALS, and the SOUTH MOOR COALS *may be relied upon for all practical purposes.*

These Coals may be bought through the Principal Merchants in England, or direct from

MR. MARK ARCHER,

HOLMSIDE AND SOUTH MOOR OFFICES, NEWCASTLE-UPON-TYNE.

LITTLE & GRAHAM, LD.

THE INCLINED RETORT SPECIALISTS

TRANSPORT APPLIANCE WORKS,
SMETHWICK,
BIRMINGHAM.

ROBERT MARSHALL,

CANNEL COAL MERCHANT,
97, WELLINGTON STREET, GLASGOW.

Prices and Analysis of all the Scotch Cannels on Application.

BOLDON GAS COALS.

Worked by THE HARTON COAL CO., LTD.

Output about 3000 tons per day.

ANALYSIS—

Yield of Gas per ton . .	10,500	Cubic Feet.
Illuminating Power . .	16·9	Candles.
Coke	66·7	Coke.
Sulphur	0·86	Sulphur.
Ash	2·04	Ash.

Boldon Gas Coals are supplied under contract to

The Gaslight and Coke Company, South Metropolitan Gas Company, Commercial Gas Company, Imperial Continental Gas Association, European Gas Company, L'Union des Gaz (the Continental Union Gas Company), Crystal Palace District Gas Company, Danish Gas Company, Bombay Gas Company, San Paulo Gas Company, Alliance and Dublin Consumers' Gas Company, Ipswich Gaslight Company, Newcastle Gas Company, Sunderland Gas Company, South Shields Gas Company, and to many other Companies at Home and Abroad.

For Prices, &c., apply to the

HARTON COAL COMPANY,

LIMITED,
Newcastle-on-Tyne.
W. H. PARKINSON,
FITTER.

JAMES OAKES & Co.,

ALFRETON IRON-WORKS, DERBYSHIRE,

AND

Wenlock Iron Wharf, 21 & 22, Wharf Road, CITY ROAD, LONDON, N.,

Manufacture and keep in Stock at their Works (also large stock in London)

PIPES and CONNECTIONS, 1¼ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with bolts, nuts and covers, and rendering leakage impossible.

THORNLEY GAS COALS

WORKED BY THE

WEARDALE IRON & COAL Co., LD.

OUT OF THEIR

THORNLEY AND WHEATLEY HILL COLLIERIES.

Analysis made by

Messrs. J. & H. S. PATTINSON, *May 28, 1895.*

Yield of Gas per Ton . .	10,500 Cub. Ft.
Illuminating Power . .	16·9 Candles.
Coke (of good quality) . .	67·5 per Cent.
Sulphur	0·58 ,,
Ash	2·73 ,,

For Price, &c. apply to the

WEARDALE IRON & COAL Co., LD.

QUAYSIDE, NEWCASTLE-ON-TYNE.

Awarded HIGHEST MEDAL and DIPLOMA at the Newcastle-on-Tyne Royal Mining and Industrial Exhibition, 1887, for

CANNEL & COAL.

TYNE

BOGHEAD CANNEL.

Yield of Gas per ton	13,155 cub. ft.
Illuminating Power	38·22 candles.
Coke per ton	1,301·88 lbs.

EAST PONTOP GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	17·8 candles.
Coke	70 per cent.

SOUTH PELAW MAIN GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	16·3 candles.
Coke	73·1 per cent.

For Prices and complete Analysis, apply to

THOS. W. DANCE & SONS,

COAL OWNERS, NEWCASTLE-ON-TYNE;
OR
E. FOSTER & CO.,

12, JOHN STREET, ADELPHI, LONDON, W.C.

THE

Incandescent Gas-Light Co., LIMITED.

(WELSBACH Patents.)

Pronounced by Mr. Justice Wills, and confirmed by the Court of Appeal, to be

"A PIONEER INVENTION."

FURTHER DEVELOPMENTS; ENORMOUS ECONOMY;
IMMENSE SUPERIORITY; IMPORTANT IMPROVEMENTS.

THE NEW "GEM" BURNER, 5s. 6d.

THE NEW "GEM," 5s. 6d.

THE NEW "GEM," 5s. 6d.

35-Candle Power from $1\frac{3}{4}$ Cubic Feet of Gas!!!

THE "GEM" BURNER IS SPECIALLY SUITABLE FOR DOMESTIC LIGHTING.
GREATLY IMPROVED DISTRIBUTION OF LIGHT.
IT IS THE BRIGHTEST "GEM."
20 Candles per Cubic Foot of Gas!!!

The WELSBACH INCANDESCENT GAS-LIGHT IS

THE MOST ECONOMICAL
THE MOST BRILLIANT
THE MOST HEALTHY
THE CLEANEST GAS

} LIGHT

THE "GEM" BURNER, 5s. 6d.

THE "C" BURNER, 6s. 6d.

THE "C" BYE-PASS BURNER, 7s. 6d.

Further Particulars and Price List can be had on application to the Company's Agents or leading WHOLESALE HOUSES, or to the

INCANDESCENT GAS-LIGHT CO., Ltd.,
14, Palmer Street, Westminster.

Limp Cloth; Price 2s., free by post.

NEWBIGGING'S TABLES
OF GAS VALUES, DISCOUNTS, DIVIDENDS, AND WEIGHTS AND MEASURES,
FOR USE IN GAS OFFICES.

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BOWENS' Ltd. Successors,
STOURBRIDGE.

MANUFACTURERS OF
BEST FIRE-BRICKS; INCLINED, HORIZONTAL, and SECTIONAL RETORTS; LUMPS, TILES, &c., of every description.
Established 1860.

ARROL-FOULIS
Patent Automatic Machinery
FOR
DRAWING AND CHARGING GAS-RETORTS.

Full Particulars may be obtained from the Sole Makers,
SIR WILLIAM ARROL & CO., Limited,
GLASGOW.
[See Illustrated Advertisement, July 7, p. III.]

Price 21s., Post Free,
PRECEDENTS IN PRIVATE BILL LEGISLATION
AFFECTING GAS AND WATER UNDERTAKINGS, 1879-90.
Compiled by E. H. STEVENSON & E. K. BURSTAL.

London: WALTER KING, 11, Bolt Court, Fleet St., E.C.

STOURBRIDGE
RETORTS AND FIRE-BRICKS.
BEST QUALITY.
KING BROTHERS, STOURBRIDGE.
[See Illustrated Advertisement, July 7, p. 52.]

OXIDE OF IRON.
NATURAL BOG ORE FROM OWN MINES.
Samples and Prices on application.
WM. H. MÜLLER & CO.,
81, PALMERSTON BUILDINGS, LONDON, E.C.
TRADE MARK: "Compascum." Telegraphic Address: "FERRUM."

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MANUFACTURERS OF GASELIERS IN GLASS AND METAL.

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MESSRS. HUMPHREYS & GLASGOW

Have constructed their EUROPEAN type of

CARBURETTED WATER-GAS PLANT

At the following Gas-Works:—

Copenhagen	700,000 Cub. Ft.	Liverpool	2,500,000 Cub. Ft.
Belfast	1,700,000 ,,	Brighton	1,250,000 ,,
Glasgow	300,000 ,,	Bath	1,000,000 ,,
Brussels	700,000 ,,	Preston	1,500,000 ,,
Santiago	400,000 ,,	Southport	750,000 ,,
Swansea	700,000 ,,	New York	1,000,000 ,,
Tottenham	600,000 ,,	Newburgh, N.Y.	350,000 ,,

And have now under Contract:—

Belfast (Second Contract)	3,500,000 Cub. Ft.	St. Joseph, Mo.	750,000 Cub. Ft
Edinburgh	2,000,000 ,,	Holyoke, Mass.	500,000 ,,
Tottenham (Second Contract)	750,000 ,,	Shanghai	225,000 ,,
Winchester	200,000 ,,	Stockton-on-Tees	600,000 ,,
Hoylake	125,000 ,,	Stockport	600,000 ,,
Manchester	3,000,000 ,,	Norwich	1,250,000 ,,
Brussels (Second Contract)	700,000 ,,		

In addition to which the previous Installations of The Gaslight and Coke Company under this System have a total capacity of 10,000,000 cubic feet per diem.

9, Victoria Street, London, S.W. Telegrams: "EPISTOLARY, LONDON." *United States Office, 64, Broadway, New York.*

Wrought-Iron

And Fittings and Accessories.

LAMBERT BROS., WALSALL,
MANUFACTURERS OF
WROUGHT-IRON TUBES & FITTINGS for GAS, WATER, & STEAM,
BRASS GAS-FITTINGS, GAS-VALVES, STEAM & WATER VALVES, TOOLS, &c., AND OF WARNER'S PATENT MARKET GAS STAND-PIPE.
LONDON: LAMBETH BRASS & IRON CO., Short Street, LAMBETH.

WILLEY & CO.,

GAS ENGINEERS,

LONDON & EXETER.

Offices: HAVEN ROAD, EXETER.

MANUFACTURERS OF

GASHOLDERS, ROOFS, BRIDGES, GIRDERS,

AND EVERY DESCRIPTION OF

GAS APPARATUS.

MAKERS OF THE LIVESEY WASHER.

AGENTS FOR THE MAXIM CARBURETTOR.

Engineering Works: ST. THOMAS, EXETER.

Manufacturers of WET and DRY GAS-METERS of unsurpassed excellence.

Patent Penny-in-the-Slot AUTOMATIC METER with the latest improvements. Fraud Proof, Perfect in Action, Accurate in Registration, Instantaneous Price Adjustment *in situ* without Change Wheels.

Meter Factories: JAMES STREET, EXETER, and 248, KINGSLAND ROAD, LONDON, N.

Metropolitan Agent:

FRANK ACLAND, M.Inst.M.E., M.Inst.C.E., 70, Cheapside, E.C.

MANUFACTURERS OF

GAS-FITTINGS

IN ENDLESS VARIETY.

CHANDELIERS, BRACKETS, PENDANTS, MAIN COCKS, &c., &c., &c.

SPECIAL FITTINGS FOR THE AUTOMATIC BUSINESS.

Brass Foundries and Works: ST. THOMAS, EXETER.

Telegraphic Address: "WILLEY, EXETER." Telephone 132. Established over 30 Years.

GODDARD, MASSEY, & WARNER'S

IMPROVED

Sulphate of Ammonia Apparatus.

The most successful and approved Apparatus known up to the present time.

FOR REFERENCES, PARTICULARS, TESTIMONIALS, AND PRICES, APPLY TO

GODDARD, MASSEY, & WARNER,
ENGINEERS,
NOTTINGHAM.

The Apparatus has been supplied to the following Firms—

BURT BOULTON, & HAYWOOD, SILVERTOWN, and ELING.
CHANCE BROTHERS, OLDBURY (Four Apparatus).
RUNCORN SOAP & ALKALI CO., Limited, RUNCORN.
NETHAM CHEMICAL CO., Limited, BRISTOL.
ANIMAL CHARCOAL CO., Limited, SHADWELL.
WM. BUTLER & CO., BRISTOL.
KEMPSON & CO., Pye Bridge.

And to the following Gas Companies and Corporations—

ILKESTON.	BURY.	CHORLEY.
WIDNES.	BRIGHOUSE.	WHITEHAVEN.
HALIFAX.	MARKET HARBRO'	CHESTER.
ALTRINCHAM.	PRESCOT.	SOUTH SHIELDS.
DENTON.	SOWERBY BRIDGE.	LEEK.
ST. ALBANS.	LEICESTER.	IPSWICH.
DUKINFIELD.	DARWEN.	BOURNEMOUTH.
NORTHWICH.	NELSON.	SALFORD.
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HARPER & MOORES,
STOURBRIDGE.

MANUFACTURERS OF

BEST FIRE-BRICKS, GAS-RETORTS,
LUMPS, TILES, AND ALL ARTICLES IN FIRE-CLAY.
Proprietors of Best Glasshouse Pot, Crucible, and other Stourbridge Clays.

MANUFACTURERS OF GLASSHOUSE POTS AND CRUCIBLES OF EVERY KIND.
ESTABLISHED 1826.

JOSEPH CLIFF & SONS,
INCORPORATED IN
THE LEEDS FIRE-CLAY COMPANY, Ltd.,
WORTLEY, LEEDS.

LONDON OFFICES & DEPÔTS:
Baltic Wharf, Waterloo Bridge.
WHARVES NOS. 2 & 4, INSIDE G.N. GOODS YARD, KING'S CROSS, N.
LIVERPOOL:
16, Lightbody Street.
LEEDS:
Queen Street.

MACHINE-MADE RETORTS

Have been made in large quantities for the last twelve years; and during the whole of that time, have been in regular use at most of the largest Gas-Works in the Kingdom. They possess the excellent quality of remaining as near stationary as possible under the varying conditions of their work—a quality which will be appreciated by all Gas Engineers and Managers. The generally expressed opinion is that these Retorts are the very best that are made.

RETORTS CAREFULLY PACKED FOR EXPORT.

Fire-Bricks, Lumps, Tiles, &c., &c., of every description suitable for Gas-Works.

THE PEEBLES PROCESS.

The Oil Gas Enrichment Company's Patents.

This Process for Enriching Coal Gas has now been adopted by nearly **50** Gas-Works at Home and Abroad, and continues to give complete satisfaction.

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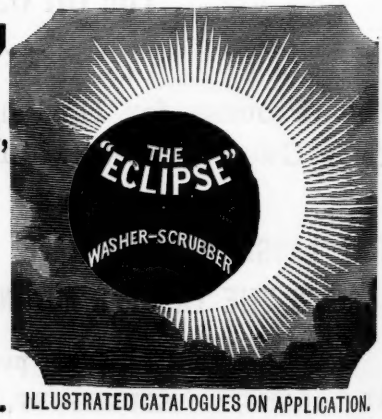

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